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EDITORIALS

THE ILLUMINATING ENGINEERING LECTURE COURSE.

As was announced some months ago, the Illuminating Engineering Society has made arrangements with the University of Pennsylvania by which there will be given under their combined auspices a series of lectures on illuminating engineering during the week following the annual convention of the Society. This convention will be held at the University on September 18 to 21 and the lecture course will extend from September 21 to 28, inclusive.

This is the second time that the Illuminating Engineering Society has essayed an enterprise of this kind. In the fall of 1910, following the Baltimore convention, a series of lectures was given with the co-operation of Johns Hopkins University at that institution, and it proved a very notable event. These lectures were later printed in book form and constituted an important addition to the literature of the subject, and the edition was soon exhausted. In the six years which have since elapsed great progress has been made in illuminating engineering, both as a science and as an art. Many changes in the available illuminants and accessories have been made, methods of applying them have been improved and the knowledge of both the principles involved and the applications in practice have been considerably amplified. It is fitting, therefore, that the present administration of the Society has considered it feasible to inaugurate a similar series of lectures this year.

Au outline of the series of lectures has been made, and a preliminary list of subjects and of the lecturers who will deal with them is given upon another page of this issue. The accomplishments of the men who have been chosen to give these lectures and their well known ability in the several lines of practice involved is sufficient guarantee of the excellence of the approaching lecture course. In comparing this list with that given in 1910 it will be noted that less attention is given to the elementary principles and the scientific relationships involved, and greater attention to the art of the subject and its application in practical illumination problems. The specific lighting problems which arise in the illumination of particular classes of buildings and of outdoor areas are given particular attention, and the value of this course of lectures will be great to every one whose work involves problems of this nature.

The importance of scientific illumination properly applied is being more appreciated every year and it is essential that all who are in a position to plan installations or to give advice to those who have the determination of such matters should be fully informed upon the most important methods and means. The electrical engineer, the gas engineer, the central-station solicitor, the architect and the electrical contractor all have occasion to apply the principles which will be here set forth, while the college instructor, the ophthalmologist and many other engineers should have the knowledge which enables them to discriminate between good and bad practice. We consequently urge upon all of our readers whose work involves problems of illumination to consider the advisability of benefiting by this course, the tuition fee for which is small, while the time necessary is not more than can usually be taken away from business to advantage by those whose work is involved. Every central station in the country which attempts to advise its customers upon lighting requirements should be represented at this course and the same may be said also of every electrical contracting firm. The contractor is repeatedly called upon to advise customers as to suitable lighting installations and indeed in some cases the entire layout is left to him. With a knowledge of the best practice he will be in a much better position to fulfill this obligation and to install work which will result in establishing a reputation of lasting benefit to both himself and his customers.

LICENSES FOR ELECTRICAL CONTRACTORS.

Letters from a number of electrical contractors, reproduced elsewhere in this issue, show that there is a very general sentiment among them in favor of legislation for licensing electrical contractors. Very few of the states so far have such license laws, but their number is supplemented by a considerable number of municipalities in other states which have through local ordinances adopted this method of protecting the public and the legitimate contractor. Such action has no doubt come about on account of the lack of an adequate state law, as it is the general consensus of opinion that state legislation upon this subject is preferable to municipal legislation. In addition to being more comprehensive, a single state license then makes it possible for a contractor to do business in more than one municipality, and this is frequently desired under modern business conditions. Indeed, many contractors carry on work in more than one state.

The object of a license law is, of course, to protect the public from the work of incompetent and irre-

sponsible contractors and to protect the legitimate contractor from the competition of such persons. The latter is usually the chief motive which actuates the electrical contractors in fostering such legislation, but it should be borne in mind that the legislation can be secured usually only upon the wider grounds of protection to the general public.

To be effective, a license law should require not only the registration of the contractor but the passing of an examination which shall show his fitness and competency to carry on the work. To be trustworthy the contractor should meet two requirements, ability and honesty; that is to say, he should be not only competent to do the work, but should be actuated by a desire to do it properly. Only the first of these requirements can be tested by means of an examination. The second requirement can be tested only through inspection of his work after it has been done. Attempts to regulate electrical construction work through licensing may succeed in eliminating the ignorant and incompetent contractor, but may fail to eliminate the man who willfully installs inferior work or inferior materials unless there is efficient inspection. Indeed, of the two, inspection is likely to prove more effective in its results than licensing. The best conditions will be secured when both licensing and effective inspection are provided for and efficiently carried out. Laws in regard to licensing and inspection, like most other laws, are worse than useless unless thoroughly and generally enforced.

In some cases, more especially in municipalities having a local law, a bond is required of the contractor in place of an examination. While a bond cannot insure ability upon the part of the contractor, it serves to a certain extent to make him responsible, in that defective material or workmanship can be replaced if it is discovered. Here again, the bond will seldom give the desired protection unless reinforced by inspection. A bond will usually be found less effective than the power, enforced when necessary, of revoking the license for any violation of the provisions of the law. Where a local bond is required, however, the effort should be made to let it stand as a protection to the person letting a contract on every job undertaken by the contractor, thus obviating the necessity of putting up a bond upon each job, such as is usually required at least on official work.

While considerable opposition has been manifested in certain states to the passing of a license law, there are possibilities for procuring such protection in many of the states if the contractors would take concerted action through their state organizations or otherwise to push the matter. If it is made evident that the irresponsible contractor is a menace to the public as well as a thorn in the flesh of his more reliable competitor, it will be easier to secure the attention of legislators and the backing of public opinion.

MORE CO-OPERATION NEEDED IN ENGLAND.

Mr. Alexander Cramb, president of the English Municipal Electrical Association, addressed some plain words of warning to electrical contractors in his inaugural statement at the convention held in London on June 22. Speaking as a leading representative of the central stations who want to avail themselves of every facility for encouraging the use of electricity for domestic and small industrial service, he argued for a more general spirit of co-operation in the electrical industry, and according to his criticism the chief fly in the ointment is the contractor who will not co-operate with the central-station engineers and managers. The contracting firms of course consider that they have ample justification for the attitude that they have assumed toward the Association's desire for wider powers from Parliament to assist in the full development of electric undertakings, but it appears that the Manufacturers' Association has expressed itself satisfied with the fairness and reasonableness of the central stations' concessions and conditions, and has used its kindly offices in order to bring about agreement.

We have shown in these pages several times during the past year that influences have been at work, both by negotiation and by practical demonstration in cities such as Glasgow, which promised to lead to a settlement of differences so that central-station managers, contractors and manufacturers could all unite in one strong and consistent progressive policy which would steadily advance the whole electrical cause. But that goal has not been reached. Mr. Cramb wants to know how much longer the policy of "obstruction" by a small section of the industry will be allowed to continue to "seriously curtail the development of the business" of all the three interests that we have mentioned. A few years ago the indiscretions of certain aggressive spirits led to the belief that the central stations wanted to dispense with the contractors altogether. That belief is taking a long time to die out.

It seems, from Mr. Cramb's remarks, that the bill that the Association wants to secure from Parliament guarantees that all wiring work shall be placed in the hands of the contractors, and that central stations are to be limited to prices which contractors can safely underquote; also that increased business will result through renting systems in which there would be no bad debts, but the contractors "still hesitate to join in a course which holds the promise of a considerable expansion of profitable business." The Municipal Electrical Association has in the past aimed at effecting an agreement which should be equitable to the various interests, but, says Mr. Cramb, "it may become necessary to adopt a more active policy to create a greater desire for settlement."

It is considered that when the time comes for settling down to peaceful life again, after the war, there will be a general aim and expectancy for greater effi-

ciency and progress in business, and that in co-operative action quicker and better results will be attained.

THE RELATIVE IMPORTANCE OF VARIOUS ELEMENTS IN STREET LIGHTING.

The illumination of streets presents one of the hardest problems for the illuminating engineer on account of the large number of variables which enter into the conditions met and into the effectiveness of any system of lighting which may be adopted. Various criteria for determining the effectiveness of street illumination have been proposed from time to time, and the complication of the problem presented is due to the fact that no one of these is sufficient in itself or can be given predominating weight except in particular instances. A number of elements must be considered if the best results are to be obtained, and it is difficult to properly weight each of these elements and obtain the resulting comparisons of different systems which shall be in every way satisfactory and decisive.

These facts have perhaps nowhere been made more plain than in an article, "Tests of Street Illumination," by Mr. Preston S. Millar, which appears in the last issue of the *Transactions of the Illuminating Engineering Society*. Mr. Millar has been a student of this subject for years and has made some valuable contributions to our knowledge of what is desirable in street lighting and what elements of the illumination contribute to the effectiveness of a lighting system. Mere measurements of intensity, whether upon a horizontal, vertical or other plane, do not give sufficient information to determine the best lighting. In connection with the Street Lighting Committees of the Association of Edison Illuminating Companies and the National Electric Light Association, Mr. Millar has worked out a set of observational tests which actually measure the ability of observers to detect test objects placed upon the roadway and it is found that the ability to discern such objects depends upon a number of influences. Such elements as glare, condition of background and reflecting power of the street surface all have an influence upon the effectiveness of the illumination and the wide variety of such variables can best be taken care of by actual tests of the ability to see.

After giving a description of such tests in comparing street illumination by different types of lamps, Mr. Millar points out that in addition to considering effectiveness of illumination, the appearance of the installation must be taken into consideration, and especially so when the appropriation for the purpose is large. In the case of small appropriations he advocates paying particular attention to secure effectiveness of illumination, but where the amount of light is sure to be sufficient the character of the units selected will naturally be affected by their daylight appearance.

The question of intensity of illumination in regard to its effectiveness for street-lighting purposes is a mooted question and one which will require considerably more experience before any particular dictum on the subject will receive general acceptance. It is apparent at once that such a thing as even approximate uniformity is never obtained, but the engineers who have designed certain installations have sought to make the non-uniformity as small as possible. On the other hand, other engineers maintain that extreme non-uniformity is no disadvantage and that the contrasts thereby occasioned are actually helpful in discernment at night. Some experiments carried out by psychologists in this connection have indicated a stimulation of attention of the observer where the illumination is distinctly non-uniform, and that the individual reacts to a stimulus indicating danger more rapidly under such a condition. This leads to the conclusion that a more non-uniform illumination contributes to the safety of the pedestrian upon the streets.

THE USE OF THE SPHERE PHOTOMETER IN STREET-LIGHTING TESTS.

One of the interesting conclusions in the paper above referred to is that the relative merits of different units for street-lighting purposes is largely determined by the total flux of light emitted, regardless of what the particular distribution of this flux may be. Great stress has sometimes been placed upon the distribution curves of street-lighting units in determining their appropriateness for the purpose, but Mr. Millar evidently finds that very little weight is to be attached to this element in reaching a conclusion as to the effectiveness of different types of unit.

Where the total flux of light from a lamp becomes the principal element of interest in its performance, the problem of carrying out measurements of the light becomes a simple one, since the sphere photometer gives a measure of the total flux by means of a single observation. This form of photometer has come into wide use for laboratory and test-room purposes, but in the work described by Mr. Millar it has also been applied to tests of street lamps after they are placed in operation. A photometer was mounted upon a truck and the lamp to be tested had merely to be lowered to a convenient height in order that a test could be made upon the street, and its total flux determined under operating conditions. This obviates the objection to laboratory tests and is also a much shorter procedure than a long series of illumination measurements at different points in the street to determine the distribution of light produced by a given source. It is probable that this use of the sphere photometer will be greatly extended in street-lighting tests, and it should be noted that a simple measurement of this kind will often be sufficient to determine whether the main element in carrying out a street-lighting contract, that is to say, the delivery of a specified amount of light, is being met. The problem here is, of course, an entirely different one from that of selecting a lighting system or determining upon the specification. Nearly every other element of a street-lighting specification can be checked by mere inspection and measurement of this kind will check the amount of light.

Happenings in the Industry

Oregon Electrical Contractors and Dealers Hold Successful Meeting at Portland—Many Artistic Posters Submitted in "America's Electrical Week" Poster Competition—James Frank Morrison, First President of the N. E. L. A., Dead—Program of Lectures to Be Given Under Auspices of Illuminating Engineering Society

Oregon Electrical Contractors and Dealers Meet.

Seventy-four members of the Oregon Association of Electrical Contractors and Dealers attended the quarterly meeting and banquet held in Portland, Ore., June 28. Delegates to the convention were entertained by a drive over the new Columbia River Highway and a dinner at Crown Point Chalet.

Addresses on subjects of particular interest to the men of the trade in attendance were delivered. S. M. Averill, general manager of the Fobes Supply Company, of Portland and Seattle, Wash., talked on trade acceptances and the advantages of the new plan by which trade acceptances can be used by merchants in their business. He showed how the electrical dealers would profit by this new form of credit. J. W. Oberender, secretary of the association, reported on the advisability of changing the state lien law, as it applies to supplying materials for building purposes, in accordance with the changes which have been proposed by the Material Dealers' Credit Men's Association. Other speakers were: Ross Hartley, Pacific States Electric Company, Portland and Seattle, and Mr. NePage, of NePage-McKenna Company, of Seattle and Portland, who urged that the electrical dealers of the Pacific Coast co-operate.

Following Mr. NePage's suggestion, President W. O. Fouch, of the association, appointed a committee to work on the plan of extending the organization to take in the entire Pacific Coast territory. The association was organized in February, of this year. Its membership roll includes dealers in all parts of Oregon.

America's Electrical Week Poster Competition.

Noted artists, art students, and high-school pupils from nearly every leading city, entered posters in the $2,200 electrical poster prize competition, conducted under the auspices of the Society for Electrical Development. The competition was announced in April and closed June 1, 1916. The competition was for a poster to be used as the official design for the "America's Electrical Week" campaign.

When midnight came June 1, nearly 800 posters had been received at the Society's offices in New York. One-third of the posters were by professional artists of international reputation, whose names are synonymous with the best in art. Several of the entries were prize winners in other important competitions. Many were entered by French, Belgian, Italian and German artists who have entered the poster field here because of war conditions abroad.

The balance of the designs, about 500, were done by younger artists in academies and high schools where industrial art is taught. Many of the finest industrial posters produced in American were entered in the competition.

The theme of the poster is to symbolize or portray electricity as the greatest factor in modern civilization. The artists were given the widest range for their conception. No important limitations were imposed on their creative skill, except that the contestants were asked to eliminate the suggestion of lightning. Artists were asked to bear in mind that electricity has three distinctive influences—light, heat and power, all of which are essential in social and industrial progress. The society, in other words, announced its desire to obtain a poster which would clearly and forcibly stand for Electricity.

For the best posters, prizes aggregating $2,200 were offered. The first prize of $1,000 will be awarded to the winning design which the judges choose as the best and most appropriate poster submitted. Following are the other prizes: $500 second prize, $300 public choice prize, $200 art students' prize, $200 in school prizes.

The judges will determine the winners of the grand and second prizes, the art students' prize and the school prizes. The announcements of the winners will be made late in July.

The public choice prize will be determined by the highest total of votes registered at exhibitions in New York, Chicago, Cleveland, and Philadelphia, in favor of any of the designs deemed suitable for these exhibits by the judges.

The New York exhibit drew an attendance of nearly 3,000 persons. The Philadelphia exhibit was held at the Exposition building during the recent convention of the Associated Advertising Clubs of the World.

The originals for which the grand prize, second prize, public choice prize, art students' prize and the first of the school prizes are awarded, become the property of the Society for Electrical Development.

The Society made a condition of the competition that each contestant be required to set a fair market price for his poster. This was done to give member companies an opportunity to buy any design except the first-prize winner. It was understood that each poster and the idea it carried would remain the property of the artist unless it was purchased. This was agreed upon to afford the artist protection. Any inquiries directed to the Society regarding the purchase of any of the posters will be promptly answered.

Authorities on industrial art, who have seen the posters, state the exhibit has never been equalled anywhere. Many of those who attended the New York exhibit declared it surpassed many similar exhibits in Europe.

Alternating Current for Railway Operation Would Show Saving.

A saving of more than $400,000 per year over the present cost of direct-current power used by the Bay State Street Railway Company would be possible were the company to build a large central alternating-current station and serve the territory over 33,000 or 42,000-volt lines, according to a report to the Massachusetts Public Service Commission by Bion J. Arnold, of Chicago. Fixed charges on the new plant, reckoned at 6 per cent, would, however, neutralize the gain, since the present direct-current stations are being operated with reasonable efficiency and would have to be scrapped at large capital loss were the change to alternating-current generation to be made.

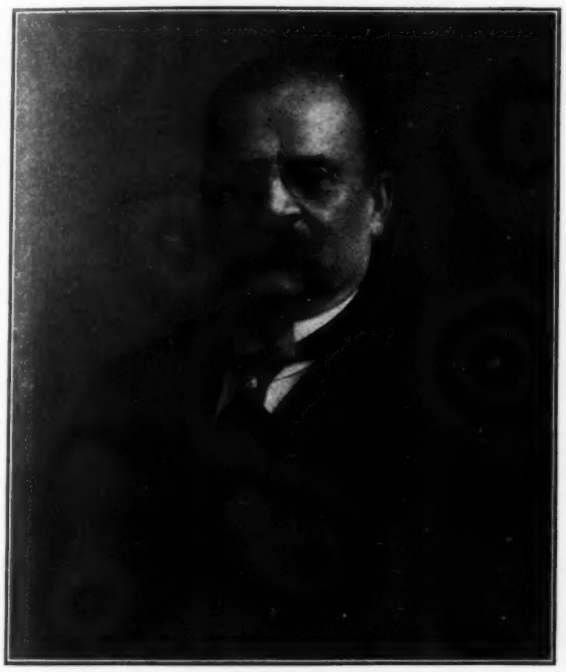
Present costs of generating this direct current are 0.871 cent per kilowatt-hour without fixed charges, and 1.375 cents, including them. Alternating current generated for the southern divisions of the railway costs the company 0.577 cent without fixed charges, and 0.926 cent with.

JAMES F. MORRISON DEAD.

Pioneer Electrical Man Was First President of National Electric Light Association.

James Frank Morrison, a historic figure in the electrical industry, died at his home in Baltimore, Md., on July 3. Although in poor health for the past six months his death came as a shock to his many friends who had held out hope for his recovery.

Mr. Morrison was the first president of the National Electric Light Association, and for many years after its first meeting in 1885 he was a conspicuous figure in Association affairs. He was re-elected president of the Association each year until 1888. He is credited with having more to do in establishing the organization upon a logical basis and with making possible the great developments which have ensued since that time than any other man connected with the early history of the organization. At the recent convention of the National Electric Light Association in Chicago, a resolution was adopted conveying to Mr. Morrison the greetings of the Association and expressing the hope that he would soon be restored to health.



James Frank Morrison.

Mr. Morrison was born at St. John, N. B., on April 18, 1841. He went to Boston, Mass., with his parents when fifteen years of age, and spent much of his spare moments in the study of telegraphy, acquiring also considerable experience and a splendid reputation in mechanical engineering. He was a telegraph operator for the Baltimore & Ohio Railroad from 1862 to 1868, and was night manager for the Western Union Telegraph Company at Baltimore, Md., from 1868 to 1870. He became superintendent of the fire alarm system in Baltimore in 1870, entirely reorganizing the fire-alarm and police telegraph systems. In 1878 he constructed for the Chesapeake & Ohio Canal Company the first long-distance telephone line in the world, covering a distance of 210 miles, from Georgetown, D. C., to Cumberland, Md. He was a pioneer in the electric lighting business, constructing the first complete lighting station at Baltimore. He was prominent in Democratic political affairs, and was clerk of the Maryland Senate in 1876; fire commissioner for Baltimore from 1884 to 1887, and warden of the city jail of Baltimore from 1879 to 1887. His connection with the electrical industry included operations in construction, in manufacturing and in the executive departments of lighting organizations. He was manager of the Edison Electric Illuminating Company and the Fort Wayne Electric Corporation. He organized, in October, 1897, the Northern Electric Company, which was consolidated in January, 1899, with the Edison, Brush and other stations into the United Electric Light and Power Company of Baltimore. He was a man of great physical energy and peculiar driving force.

Illuminating Engineering Lecturers Announced.

Announcement has been made of the lecturers who will participate in the illuminating engineering lecture course, to be given at the University of Pennsylvania immediately following the annual convention of the Illuminating Engineering Society next September. The preliminary list of lecture subjects and lecturers are as follows:

	Subjects.	Lecturers.
(A)—General		
(1)	Illumination Units and Calculations	A. S. McAllister
(2)	Modern Photometry	Clayton H. Sharp
(3)	The Principles of Interior Illumination (Two Lectures)	Committee J. R. Cravath, chairman
(4)	The Principles of Exterior Illumination	Louis Bell
(5)	Color in Lighting	M. Luckiesh
(6)	Architectural and Decorative Aspects of Lighting	Guy Lowell
(7)	Recent Developments in Electric Lighting Appliances	G. H. Stickney
(8)	Recent Developments in Gas Lighting Appliances	R. F. Pierce
(9)	Modern Lighting Accessories	W. F. Little
(B)	Special Lectures on Interior Illumination	
(10)	The Lighting of Factories, Mills and Workshops	C. E. Clewell
(11)	The Lighting of Offices, Stores and Shop Windows	Norman Macbeth
(12)	The Lighting of Schools, Auditoriums and Libraries	F. A. Vaughn
(13)	The Lighting of Churches	E. G. Perrot
(14)	The Lighting of the Home	W. H. Jordon
(15)	Railway Car Lighting	G. E. Hulse
(C)	Special Lectures on Exterior Illumination	
(16)	Street Lighting (Two Lectures)	P. S. Millar and C. F. Lacombe
(17)	The Lighting of Yards, Docks and Other Outside Works	J. L. Minick
(18)	Headlights, Searchlights and Projectors	E. J. Edwards
(19)	Sign Lighting	L. G. Shepard
(20)	Building Exterior, Exposition and Pageant Lighting	W. D'A. Ryan

Georgia Contractors Hold Meeting.

The quarterly convention of the Georgia Electrical Contractors' Association was held July 5 and 6 at Savannah, Ga., with a good attendance from all sections of the state. There was no formal program, the meeting being made up of routine business and short talks on electrical subjects by the members. A large number of jobbers and manufacturers' representatives were present. A banquet was given to the visitors by the Savannah contractors and a luncheon was held with William Cole, of the Sprague Works of the General Electric Company, as host. The officers were elected at the April meeting. L. M. Clayton, of Atlanta, president, presided over the meeting.

National Electrical Contractors' Association

A Brief Historical Sketch of the Association With an Outline of Its Accomplishments and Benefits to Members—Arrangements and Program for Annual Convention at New York, N. Y., July 19 to 22

IN 1901, 49 progressive electrical contractors, who sincerely believed that the business needed improvement, met and formed the National Electrical Contractors' Association of the United States. Today, this organization, in its original form and largely guided by the same men, is one of the great factors in the electrical industry and, incidentally, has a combined purchasing power of individual members reaching enormous proportions.

The Association had its origin in New York. Electric lighting and power applications have had a rapid expansion and those who entered early into the field of electrical construction necessarily had little time to devote to the study of the financial or business end. Finally, however, it became essential, if the industry was to be stabilized, that the contractor be versed in bookkeeping, estimating, financing and other managerial problems and, as a result, groups of contractors in various prominent localities got together to discuss their mutual problems. These local associations proved of much benefit and after such organizations had operated successfully in Buffalo, Rochester, Syracuse, Utica, Troy and in New York City, these bodies met at Buffalo and formed in 1899 what still exists as the Electrical Contractors' Association of New York State.

Some three years later came the Pan-American Exposition at Buffalo and the officials of the State Association conceived the idea of greater expansion of the work that had proved so beneficial to the industry locally. Consequently invitations were extended to electrical contractors in various states to meet at Buffalo with the idea of forming a national organization. The response was most gratifying and it brought together men who today are known from coast to coast as among the greatest factors in the electrical business. It is interesting to note that many of these men, who were the originators of the National Electrical Contractors' Association, are today not only actively engaged in the electrical contracting business, but are still working conscientiously and unremittently for the welfare of the Association.

John R. Galloway, President.

After serving the National Electrical Contractors' Association of the United States several years as treasurer, John R. Galloway, at the Detroit convention two years ago, was elected president. Mr. Galloway has rendered faithful services, and retires after a most successful administration. He leaves a great record of achievement and his untiring efforts for business improvement in behalf of electrical contractors and dealers over the United States is an everlasting monument to his name. He has traveled as no other president traveled, and he had serious and complicated problems to solve. But his ability as a leader and his courteous treatment to all solved the problems. President Galloway is forceful as a speaker and his sound and convincing arguments have advanced harmony and co-operation wherever he talked. His speech at San Francisco last July won for him a living tribute of friendship. He is beloved by every member of the N.E.C.A., and all who know him have a very high regard for "Uncle John." He always gives every man a square deal, and truly it can be said of John R. Galloway that he has won a place in the hearts of men.

That the National Electrical Contractors' Association is rapidly growing in importance and is giving its members actual tangible benefits of membership has been proved by the increased number of problems solved by the Association, by the increase in revenue of the Association, permitting a broader field of work, and by the fact the Executive Committee decided to engage the services of an assistant secretary to assist the present secretary in some of the detail work of the office.

The national secretary's office, located in the Martin Building, Utica, N. Y., has been enlarged and now includes three rooms. The National Electrical Contractors' Association has many committees now at work on problems of vital importance to electrical contractors.

Among these are the following:

Committee on Industrial Development.

Committee on National Electrical Code.

Universal Data and Sales Book Committee.

Membership Committee.

Committee on Legislation and Ordinances.

Liability Insurance Committee.

Co-operative Protective Committee.

Publication Committee.

Annual Convention Committee.

Credentials Committee.

Committee on Labor.

Auditing Committee.

Nominating Committee.

Committee on Closer Affiliation Between National, State and Local Associations.

The N. E. C. A. assists other National organizations in their good work by sending representatives to the various meetings and paying the traveling expenses of the representatives and committees, so the interest of electrical contractors will be advanced. The N. E. C. A. is represented on the Electrical Committee of the National Fire Protection Association and on the Board of Directors of the Society for Electrical Development, Inc., and other organizations.

Sufficient space is not available here to mention the many big things accomplished for its members. Almost everyone in the electrical industry knows the valuable part the N. E. C. A. committees have played in the develop-

W. L. Hutchison.
First Vice-President.

J. S. Musser,
Third Vice-President.

James S. Hilton,
Treasurer.

ment of the National Electrical Code and the other work on standardization. Monuments to this cause are the standard symbols for wiring plans and the charts, showing sizes of conduit for the installation of wires and cables, now a part of the 1915 Code. The Universal Data and Sales Book, worth many times the cost of membership to an electrical contractor, is furnished without extra cost to members. It is the greatest single book on buying and selling information and electrical engineering and contracting data ever published.

The N. E. C. A. bookkeeping system, sold to members at cost, has helped many a contractor "over the hill" and gives the electrical contractor the exact financial standing of his business every month. Many systems have been sold and the renewal sheets and books for the system are shipped from the N. E. C. A. secretary's office, and the retail business, together with the shipping of the N. E. C. A. Uniform Proposals Sheets, "Gambling in Labor" time cards, "Who Loses" circulars, and Universal Estimate Sheets, all sold from the secretary's office, form a department by itself. Over 100,000 estimate sheets have been sold, and the sales of other labor saving and record sheets amount to more than those figures. The N. E. C. A. Conduit and Wire Charts, now a part of the Code, are in demand by engineers, contractors and architects.

The N. E. C. A. secretary's office averaged for the past two and a half years about 40 first-class letters a day and an average of about 1,500 pieces of circular matter a day.

That electrical contractors in each state might have direct representation in the governing of the National association, the electrical contractors are privileged to organize state associations and elect directors to serve on the National Board of Governors. After the annual convention at San Francisco last July the N. E. C. A. paid out for convention expenses, directors' and other officers' traveling expenses to the convention over $8,000, so that the state associations would not have to pay the expenses of their representatives.

The Annual Convention.

The National Electrical Contractors' Association has made a special feature in its conventions of the social side of organization effort, and it has always been a pleasure for those outside of the organization to meet with it. The plans for the annual convention at New York this year are more complete than for any other convention, and it is confidently expected by the officers of the association that from every standpoint the New York meeting will eclipse anything ever before attempted by the association. A detailed program is appended herewith.

With a view of interesting electrical contractors who are not members of the association, the Executive Committee decided to invite all contractors to attend the morning business session on Thursday, July 20, at which time two very interesting subjects will be brought forward. The first is the report of James A. Fowler, of Memphis,

George H. Duffield,
Secretary.

Harry C. Brown,
Assistant Secretary.

James F. Burns,
Sergeant-at-Arms.

chairman of the Insurance Committee on the National Plans for Joint Liability and Compensation Insurance, whereby a large saving in insurance premiums is effected by all members. His report will be supplemented by an address by L. T. Block, of the Utilities Indemnity Exchange, St. Louis.

The second feature is the report of E. McCleary, of Detroit, chairman of the National Code Committee, who will give much valuable data on this interesting subject, which will perhaps lead to a discussion of concentric wiring.

Officers.

The present officers of the association are as follows:
President, John R. Galloway, Washington, D. C.
First vice-president, W. L. Hutchison, Kansas City, Mo.
Second vice-president, J. C. Rendler, Los Angeles, Cal.
Third vice-president, J. S. Musser, Harrisburg, Pa.
Treasurer, J. S. Hilton, Syracuse, N. Y.
Secretary, George H. Duffield, Utica, N. Y.
Assistant secretary, Harry C. Brown, Utica, N. Y.
Sergeant-at-Arms, J. F. Burns, Schenectady, N. Y.

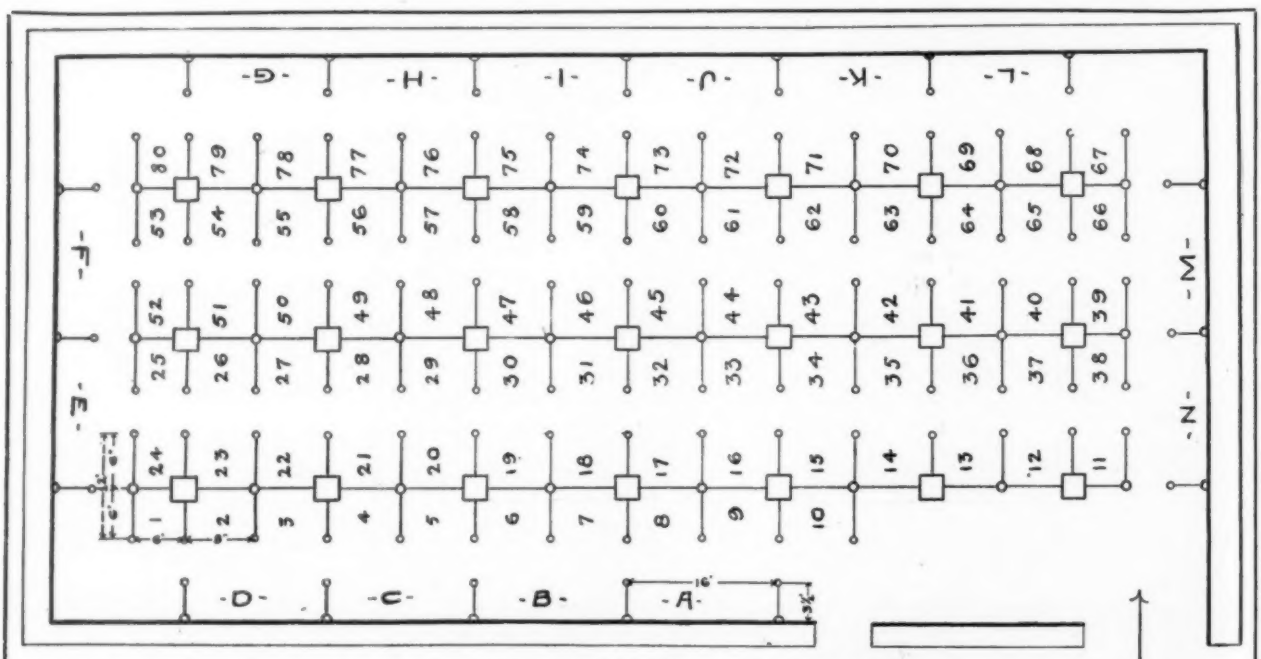
Exhibits.

Arrangements have been made with the Hotel McAlpin whereby those manufacturers who desire to exhibit may obtain space in the Terra Cotta Room in the basement where facilities have been provided for a comprehensive exhibition. While the National association has no official connection with this exhibition, it has sanctioned it and the co-operation which has so far been evidenced points to a very successful affair.

Engineering Foundation Acts in Interest of Preparedness.

The Engineering Foundation, the initial endowment of which was received last year from Ambrose Swasey, of Cleveland, and is administered in the interest of scientific research through the engineering profession by trustees from the national societies of civil, mining, mechanical and electrical engineers, recently held a meeting at which it was decided to offer the services of the Foundation to the National Academy of Sciences of the United States to accomplish the federation of all the research agencies of the nation, governmental, university and private, with the object of encouraging the application of scientific principles to American industries and the employment of science in the national defense which the possibility of war renders particularly important at this time.

The trustees present were: Gano Dunn, chairman, president of the J. G. White Engineering Corporation; Edward D. Adams, vice-chairman; Professor M. I. Pupin, of Columbia University; Benjamin B. Thayer, president, Anaconda Copper Company; Calvin W. Rice, secretary, American Society of Mechanical Engineers; E. G. Spilsbury, president, Engineers' Club; Dean W. F. M. Goss, University of Illinois; Charles F. Rand, president, United Engineering Society; Dr. Charles Warren Hunt, secretary, American Society of Civil Engineers; J. Waldo Smith, chief engineer, Board of Water Supply, City of New York, and Howard Elliott, president, New Haven Railroad.



PLAN OF EXHIBIT SPACE FOR CONTRACTORS' CONVENTION AND LIST OF EXHIBITORS

American Conduit Manufacturing Company	60-61
Block Electrical Instrument Company	47
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The Harter Manufacturing Company	68-69
The Hoover Suction Sweeper Company	35-36
The New York Edison Company	I-J-K-L
Trumbull Electric Manufacturing Company	11-12-37-38
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PROGRAM

of the

SIXTEENTH ANNUAL CONVENTION OF THE NATIONAL ELECTRICAL CONTRACTORS' ASSOCIATION OF THE UNITED STATES

New York City, July 17 to 22, inclusive.

All meetings will be held at National Headquarters, Hotel McAlpin, Broadway and Thirty-fourth Street.

An electrical exhibit will be held under the management of the Hotel McAlpin during Convention Week in the terra cotta room of the hotel.

Monday, July 17.

10 a. m.: Meeting of National Executive Committee.

Tuesday, July 18.

10 a. m.: Meeting of National Board of Directors.

Wednesday, July 19.

10 a. m.: Opening of Convention. Session open to all. Speakers:

Address of Welcome—Lewis H. Woods, president New York State Association.

Response—John R. Galloway, president National Electrical Contractors' Association.

Address—The Hon. John Purroy Mitchel, Mayor of New York City.

Address—James H. McGraw, president McGraw Publishing Company. Subject: "Electrical Merchandising."

Address—T. Commerford Martin, official secretary, National Electric Light Association.

Address—Arthur Williams, general inspector New York Edison Company.

2 p. m. Business session. Open to members only.

9 p. m.—Reception and dance—blue and green rooms, Hotel McAlpin.

Thursday, July 20.

10 a. m.—Business session. Open to all in the electrical contracting business, whether members or not.

10:30 a. m.—Ladies to visit and inspect "Altmans."

2 p. m.—Business session. Members only.

2:30 p. m.—Complimentary concert tendered to ladies and guests by the Aeolian Company at Aeolian Hall, Forty-second Street, introducing the organ, pianola and talking machine.

5:30 p. m.—Automobile trip to Coney Island.

Friday, July 21.

10 a. m.—Business session for members only.

3 p. m.—Special train on Long Island road, leaving Pennsylvania Station, to Hotel Trouville, Long Beach.

4 to 6:30 p. m.—Surf bathing, etc., at Long Beach.

6:30 p. m.—Dinner-dance and entertainment.

Saturday, July 22.

9 a. m.—Organization meeting of the National Board of Directors.

10 a. m.—Organization meeting of the National Executive Committee.

11 a. m.—Leave hotel for special boat, "Seeing New York by Water." A light luncheon will be served on board. Landing about four o'clock.

The Licensing of Electrical Contractors

A Review of This Movement for Raising the Standards of Electrical Construction by Eliminating Incompetent and Unscrupulous Contractors

THE movement for requiring electrical contractors to secure licenses before engaging in business is not new, having originated some dozen years ago. Since that time it has remained a rather frequent topic of discussion among all interested in better electrical construction and particularly among electrical contractors in their local, state or national meetings. The National Electrical Contractors' Association of the United States has had a standing Committee on Legislation, which has presented several annual reports reviewing the status of the movement and giving the text of various state laws and city ordinances that are already enforced or proposed on this subject.

A renewal of interest in the subject should take place because within the next few months there will be promulgated by the United States Bureau of Standards a National Electrical Safety Code, which has been in process of formulation for over a year and on which numerous public hearings have been held throughout the country. This new code will doubtless serve as a basis or model for much new local or state legislation and amendatory legislation on electrical matters, such as aims to increase the safety of new electrical installations and to secure safer operation of those already in existence. While such legislation is being considered, it is timely to point out that one important means of securing less hazardous electrical installations is to insure that the work will be done by competent and reliable electrical men, which means men who have been properly examined, certified and licensed to engage in such work. Consequently the subject of licensing is again worthy of special attention.

An opportune time for revival of interest in this much discussed subject presents itself due to the National Electrical Safety Code about to be issued. Contractors should avail themselves of this opportunity to agitate for the elimination of unfair competitors who are responsible for unsafe electrical construction.

This article shows that licensing and more general and rigorous inspection will drive out the usually incompetent and unscrupulous "curb-stone" contractor who undertakes work at a ruinous price and tries to save himself by using inferior materials and defective wiring.

While plans for more and better inspection are gradually being worked out, more immediate results can be secured by reviving the movement for licensing. In order to be effective, such licenses must be based on proper examination for competency and should be revocable for failure to install work properly. The licenses should be issued by a board free from political influences to safeguard their value. The article points out these and other considerations.

A condensed group of opinions on this subject by representative contractors is given. These indicate that the great majority of contractors are strongly in favor of licensing; a state license is usually preferred to a city or county license. Precautious in licensing are also pointed out in several statements. Only a few are lukewarm on the subject, principally due to experience under imperfect licensing laws.

Safety Requires Higher Standards of Electrical Construction.

Ever since electricity began to be applied for light, power or heat some 35 or 40 years ago, there has been a steady advance in knowledge of how to apply it effectively and safely. Early installations of electric circuits, in the light of present practice, were so crude and defective as to make it remarkable that there were not many more fires and serious accidents due to electrical causes than really originated in this way. For a score of years it was the custom to attribute any mysterious fire to "crossed electric wires" and even at the present day this expression is still too frequently used. While many of these cases on careful investigation have been definitely traced to other causes, the fact remains that fires due to defective electrical work do still occasionally occur. In fact, such electrical fires and serious accidents are bound to continue until positive deterrents to the further installation of hazardous electrical work and to the careless operation and maintenance of electrical equipment are set up.

Safety is one of the marked advantages of an electrical installation properly made and taken care of. Electrical apparatus, appliances and circuits have been so perfected that the hazards connected with their use can be made practically nil. Consequently there is no longer any reason why circuits or equipment that are manifestly unsafe to life or property should be allowed to be put in.

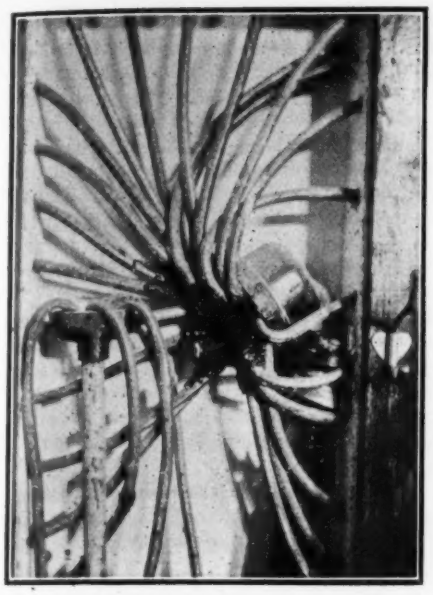
In order to minimize the fire hazard due to defective electrical construction the requirements of the National Electrical Code have been gradually made more and more specific and to minimize life hazard, as stated above, there will be issued shortly a National Electrical Safety Code. A multitude of ordinances covering electrical construction have been passed in many of our cities in recent years, so that on the whole there is already quite a mass of regulations aiming to check inferior electrical work.

Ways of Enforcing Improved Construction.

It is one thing to draw up laws, rules and regulations and quite another to see that they are carried out, because unfortunately there are elements in the population that either are unfamiliar with the laws or else have no fear of them until they are compelled to abide by them. If it were not for these elements, who do not respect the rights of others, there would really be no need for such a profusion of laws as we have nominally in force. To check the thoughtless and unscrupulous therefore requires not only enactment, but rigid enforcement, of the law. This applies to all legal efforts to enforce non-hazardous electrical construction.

There are several ways of enforcing compliance with electrical rules. One is to restrict electrical work to those who have requisite knowledge, skill and character to execute it properly. This involves an examination as to fitness and the issuance of licenses or certificates to those qualified. This is the simplest plan and in theory amply satisfactory, if there were assurance that the rigorous examination would exclude all those incompetent and unscrupulous. At any rate with an experienced and impartial examining board it serves as a check.

Another way is to have careful and continuous inspection of all electrical work as it is being installed and frequent reinspection subsequently, the inspectors having power to condemn unsatisfactory work and to order it done right. This is the most positive way to insure the elimination of electrical hazards, providing it is made general to include not only property covered by insurance or that within cities, but all property in the state. No



Typical Example of Defective Wiring Where There Is Neither Licensing Nor Inspection.

state has as yet developed such general inspection.

Still another way is to combine the two methods just referred to, depending on an examination and licensing to deter those from engaging in electrical work who are a menance to its security and whose defective work on inspection would have to be torn out and replaced at considerable cost, and depending on inspection to insure that those licensed to execute the work really carry it out properly.

Relative Need of These Different Methods.

In cities, especially large ones, the last method is undoubtedly the best, because there are so many young men with more or less superficial knowledge of electrical requirements who are eager to undertake a wiring job so as to make a little extra money. Such an opportunity may amount at first merely to wiring or fixing a bell or buzzer. Accomplishment of this encourages them to undertake the much more exacting work of wiring for light and power. Instances have also come to notice where plumbers have undertaken electrical contract work. When it is a misdemeanor to do such work without a license there is less of it done. The further requirement that no premises be served by an electric light or power company or connected to an isolated plant, of say 50 or more volts, until the electrical installation has been properly inspected and approved, removes the likelihood that hazardous wiring will be put into service.

In a small town where there is electrical inspection and the persons engaged in electrical work are quite well known, the necessity for licensing is not so great. It is also not so easy to conceal the knowledge that a house is being wired. However, there are but very few small towns that have electrical inspection and in the country outside of incorporated villages, towns or cities there is scarcely inspection even by insurance companies.

From these considerations it is clear that licensing is desirable not only in the large cities, but in the smaller communities as well. Taking country districts into account, it provides the only practical check to unsatisfactory electrical work. It is proved, therefore, that licensing is of value throughout the state and should consequently be a matter covered by a state law. Inspection likewise would be desirable throughout the state, but no practical means of meeting its cost in this case has yet been developed.

Legal Basis for Licensing.

Licenses are issued by cities, towns and states for various purposes on two principal grounds. One kind of license is issued to firms or individuals engaging in business which is more or less lucrative and which it is desired to restrict to those over whom the government can maintain a certain control, this license usually involving the payment of a rather heavy annual license fee. Saloon and theater licenses are examples of this class. These license fees form a considerable portion of the revenue.

The other kind of license is issued to individuals or firms engaging in business or practice affecting the health or safety of the public, the idea being to restrict the business to those only who are competent and can conduct it without menace to the public. Such licenses are issued to physicians, dentists, pharmacists, plumbers, etc. It is evident that the licensing of electrical contractors belongs to this class.

However, in some cities where electrical contractors are licensed, the practice regarding examinations and issuance of certificates is so perfunctory as to give such licenses little or no value, except as revenue producers to the community, like the licenses of the first class referred to. This shows the importance of care in drafting any law or ordinance covering electrical licenses and of following up its inforcement. Such an ordinance should be drawn up with the advice of a skilled lawyer so that it does not contain provisions which would make it unsatisfactory or defeat its aim. One of the things to look out for is that the law does not restrict the business unfairly or prevent others from entering into it who are fully qualified for it in every way. Any effort to enforce a law which would serve as a restraint on legitimate trade would be thrown out by the courts as unconstitutional. Therefore, the chief basis of the law should be its provision for insuring safe construction. The law must not exempt any classes of contractors or persons responsible for electrical work, if it is to be constitutional.

Exactly what provisions should be included in the law or ordinance depends somewhat on local conditions and the attitude of different interests. Among these varying features are whether the licensing should apply to wiremen or journeymen electricians, as well as master electricians, what the license fee should be, whether a bond should be filed or not, etc. The Committee on Legislation of the National Electrical Contractors' Association has on file copies of various state laws and city ordinances on the subject and can give much advice on the drafting of a proper law.

Opinions of Contractors Regarding Licensing.

Since there is quite a wide range of opinions among electrical contractors regarding the subject of licensing, an

Ruins of a Fine Residence—A Typical Effect of Defective Wiring.

effort has been made by the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN to obtain statements from leading contractors throughout the country regarding the need for licensing and how it should be brought about. From the large number of such statements secured, typical ones are published in the following paragraphs. It will be observed that a great majority favor licensing on a state basis, since this takes care of districts outside of those towns where local ordinances may cover the situation. It also provides a single uniform license on which the contractor can engage in work not only in his own city, but also in a neighboring town without the necessity of taking out a license in each community.

It will be observed in the opinions that are either neutral or opposed to licensing, other means of meeting the problem are suggested. It should be remembered, however, that licensing is not claimed to be a panacea or cure-all. It is a desirable first step or auxiliary to improving electrical construction, especially in those places where no other means are at hand. Its object is not to put all electrical contractors in the same class any more than licensing of physicians puts all doctors in the same class. The fundamental principle of it is that it requires all responsibly engaged in electrical construction to have at least that minimum knowledge of electrical requirements without which the life and property of the public is likely to be put in jeopardy.

OPINIONS FAVORING LICENSING

Statements from Representative Electrical Contractors Showing Advantages of Licensing and Reasons Therefor

Finch & Hahn, Schenectady, N. Y.

We are very much in favor of having wiremen and contractors licensed by the state, and have written our state senator on several occasions to this effect. Where the municipality only has charge of it, there is but little improvement. Any "basket" contractor can pay $1.00 for a permit and go ahead on any job. The state should take some action to protect the legitimate contractors and the public.

Hatzel & Buehler, New York, N. Y.

We are heartily in favor of licensing electrical contractors. The New York State Electrical Contractors' Association has made repeated attempts for the last ten years or more to have a license law enacted by the Legislature, but without success. We have, however, at present in New York City an ordinance requiring electrical contractors to obtain a license after passing examination before an examining board, one of whose members is a representative contractor. This ordinance is not all that could be desired, but it is a step toward the ultimate object. However, we believe that licensing of contractors should be a state movement in all cases.

Oneida Electric Company, New York, N. Y.

In reference to the licensing of electrical contractors would say that the law licensing "contractors only" is sufficient, in our estimation, and we find that since it became a law, it is doing much good for the contractors in this city.

John T. Plasket, Merchantville. N. J.

In my opinion there is not the least doubt but that the licensing of contractors and wiremen, would be a great benefit to our trade. It should be a state movement and brought about through the state contractors' associations, with a rigid examination, with no exceptions under 10 consecutive years of work or in business, and with examining boards for each county, these to be compensated from the examination fees of the applicants. There has been such a movement started in New Jersey. No doubt something will be done during the coming term of the Legislature.

Thomson & Vannington, Englewood, N. J.

We are very much interested in this matter. We believe the licensing of both wiremen and contractors will do more toward maintaining the standard of construction than any other method we know of, and at the same time eliminate a certain element who are trying to lower the standard. We favor a state license and consider the state licensing act of Massachusetts as a good example. We trust the trade will support this cause and the movement be carried to a successful end.

Iron City Engineering Company, Pittsburgh, Pa.

The Electrical Contractors' Association of Pittsburgh has advocated the licensing of all electrical contractors or persons doing electrical work in this city for several years. At the last session of the State Legislature, we presentated a bill covering this matter, but owing to the time of adjournment being close, we were unable to have same passed at that session but expect to bring same up again at the earliest date possible.

We maintain that all electrical construction and maintenance should be under state or national supervision, owing to the danger from fire and danger to the public resulting from the present slipshod methods of construction as practiced by many so-called electricians or curb-stone contractors. We have advanced from the pioneer 55-volt lighting system to the present modern system where we use voltages running into the thousands. This advancement has also added increased danger to the public without any suitable safeguards being added to eliminate the incompetent workman and his methods. Although the underwriters do good work with their inspection bureaus, there is still a large percentage of the electrical construction in this state, as well as other states, where no inspections are made and where existing conditions are deplorable, most especially since we consider electrical construction work as the leading advancement of the day.

The contractors of this city are heartily in accord with any movement leading to the licensing of electrical contractors and electrical workmen and trust that same be made a state law, as passed by the State of Massachusetts. To bring about this movement we believe the state and city electrical contractors' associations, assisted by the National Association, should start a united movement as soon as possible and work out a law which will be uniform throughout the different states. Each state association should endeavor to get the support of the organized electricians throughout its State and with their help, the necessary legislation could be readily obtained leading to the licensing of contractors and wiremen.

Harry I. Wood Company, Incorporated, Louisville, Ky.

In our opinion the matter should be handled as a state proposition. In our opinion it would be well to have a state law passed requiring the examination and licensing of all master electricians, as well as journeymen. Then anyone doing electrical work without a license would be violating the law. The licensing only of master electricians would not remedy the condition, in our opinion, as any would-be mechanic who wanted to start into the business could get together enough to take out a license, and then use unskilled labor, especially on the smaller jobs. The licensing of journeymen would do away with the majority of so-called "maintenance men" and stationary engineers and others who do electrical work around the various large plants.

J. N. Pierce, of Pierce Electric Company, Chicago.

The licensing idea is all right, but in order to make it really valuable, there must be real examinations by a competent, impartial board free from politics.

E. N. Peak, of Marshall Electric Company, Marshalltown, Iowa.

I am very much interested in this movement and am heartily in favor of suitable legislation measures being taken that would compel the licensing of all electrical contractors in the state where said contractors' headquarters are located. My idea in being in favor of a state proposition rather than a city one, is that the extending through our rural districts of the high-tension power lines of various companies brings about

a vast amount of work which is being done that is not inspected and which has a tendency to create a field for incompetent work and inferior material. I believe that this could be eliminated by the licensing of all electrical contractors and the compelling of each contractor to file a bond of sufficient amount as protection to his customers on the amount of work he does and, if at any time his work exceeds his bond, he be compelled to obtain a new one. This, in my opinion, would do away with a great many of the so-called curb-stone contractors and I can see no reason why it should not be the means of eliminating, to a great extent, the necessity of posting a bond on every little job that comes up. Make this one bond large enough and in such a way that it would serve all purposes. This also brings up the question as to the contractor's reliability. With the passing of legislative measures that would compel the licensing and bonding of the electrical contractor by the state I believe there would be but few who would not be able to handle their local necessities in every respect.

Independent Electric Company, El Paso, Tex.

It would not do any good if the contractors are licensed by the city, as there is too much politics in it in that case, but if the electrical contractors would be licensed by the state we would have a better show. Being members of the National Electrical Contractors' Association we will do all we can to help push state licenses. We have an ordinance in this city under which we have to pass an examination, take out a bond for $2,000, and pay license fees of $50 for the first year and $25 for the second and following years. If a licensing law is passed by the Legislature, we will have a better show. We would certainly like to back such a movement.

Nash Electrical Supply Company, Albuquerque, N. Mex.

We are very much in favor of the licensing of electrical contractors, and believe that a state movement is much better than a city proposition.

F. C. Green, Portand, Ore.

With regard to the licensing situation, I am heartily in accord with the state legislation on the subject but do not believe that too much emphasis should be placed upon this method of eliminating undesirables in the contracting field. I have spent recently some time in Massachusetts, and have been making a personal examination of the situation there. I am not prepared, however, at this time to make any extended comments on the situation. I believe, however, that the legislation should be statewide, and the best argument I have ever seen advanced in this connection is in the possession of D. W. Paul, of Medford, Ore. The country contractors, that is, those outside of the jurisdiction of any local inspector, need this kind of legislation more than do those members in the city. It is needless to say moreover that the property owners would be the ones who received the real benefit. Mr. Paul has a number of photographs in which fires were directly traceable to the kind of installation such legislation would have a tendency to do away with.

J. R. Tomlinson, of Pierce-Tomlinson Electric Company, Portland, Ore.

If anyone anticipates from me an enthusiastic appeal for a state license law at this time, insofar as the Oregon situation is concerned, I am afraid he will be disappointed—not that I believe such a law would be altogether undesirable—but for the reason that certain recent changes have taken place within our own ranks and also in the mind of the general public. Since our last attempt at having a license law enacted, I have made a special effort to get in closer touch with the "powers that be" through membership in various business and professional men's organizations including the Chamber of Commerce. I find a dominant disposition to smother all proposed boards and commissions, regardless of whether the proposition would be self sustaining or not. Only this week I sat at luncheon across the table from a former governor who was engaged in a debate with the present state treasurer relative to a proposed initiative law bearing on taxes and finances and he gave those present to understand that a determined effort is to be made to lop off some of the commissions we now have. In the face of such active and powerful opposition and without there being a universal demand for such a law it would, in my judgment, be a fruitless waste of funds, time and energy to try again at the next Legislature. Owing to the fact that practically all of the larger cities of the state now have fairly rigid inspection ordinances it would seem that the only portion of the state that might be interested would be outside the cities, but legislators from the rural districts have been very hard to interest in the proposition, in fact, they are rather inclined to oppose it.

The change in our own ranks previously referred to is a reorganization of the Oregon Association of Electrical Contractors and Dealers along co-operative lines. We have been operating under the new plan only since last February, but, in my opinion, more has been accomplished for the industry since that time than all the work of previous years in this state. Working under the new plan the solution of the "curb-stone" problem is within our own ranks and a year's experience will probably prove this statement. All the Pacific Coast states, including British Columbia, are operating under this new order of things and all report the same excellent results.

We cannot say that the licensing scheme would positively be applicable in the eastern states, owing to different conditions, but it is certainly worthy of the serious consideration of all legitimate electrical contractors.

B. W. Paul, Medford, Ore.

The need for statewide regulation governing the installation of electric wiring is apparent. Almost all cities consider it so to the extent of employing qualified inspectors backed by ordinances prohibiting work other than that installed according to the rules of the National Board of Fire Underwriters, the recognized standard of safety and best practice. People living in the cities have, in addition to the safest installation, the best fire protection available, namely, a trained corps of firemen on duty 24 hours daily, city water pressure, near-by neighbors to notice a fire and systems to quickly sound a fire alarm.

Yet in the outlying districts, suburban, country and small towns, most of which are without adequate fire protection even, also communities which are too small to employ an inspector, any kind of electrical installations are now made. Work is being installed by persons absolutely ignorant of the first rules of safety as regarding electrical work. These districts out of the inspectors' reach afford an outlet for all the old-Code material and junk which some unprincipled contractors wish to dispose of, and yet lead the owner to believe (and who does not know a good job from a bad one) that he is getting a first-class installation.

That work is done under such misrepresentation is shown by the pictures on page 101. The distribution cabinet is in a business block in a town of 10,000 population. The "branch circuits" shown are protected (?) by 100-ampere fuses. The ruins shown in the other picture are the remains of a residence wired with No. 6 wire fused with 100-ampere fuses. Five heater circuits of No. 12 and No. 14 wire were tapped directly off of the mains without any fuses to protect the circuits. Such installations are to be found where there is no inspection.

The only remedy, as I see it, is to provide a state law covering examination of contractors, and allowing installations to be made only by licensed firms under bond; provide a penalty for the first violation and a suspension of license for second offense; revoke license for repeated violations. Such a law would raise the standard of installation, would aid the reliable contractor, and make a hard road for the dishonest one. The object of the bond is to take care of the cost of replacing or repairing defective installations, provided the contractor failed to make good.

Doctors, lawyers, dentists, barbers, druggists, etc., must be qualified, registered or licensed before dealing with even one person, but a man with a screwdriver and a pair of pliers, without financial, moral or technical ability, can operate on the public, his work many times causing loss by fire and even life.

Let us raise the standard and uplift our profession now!

OPINIONS NEUTRAL ON LICENSING

Statements from Several Electrical Contractors Showing Shortcomings of Licensing, If Not Properly Carried Out

R. C. Stueve, of Electric Supply Company, Tulsa, Okla.

In my estimation this trouble cannot be elminated a great deal by either municipal or state licenses. There are other reasons for the existence of this "leech," one of which is the fact that happy father has a young son who is successful in installing a door bell at home. This immediately qualifies him, in the eyes of his father and friends, as a full-fledged electrician. The other reason is, that the electrical jobbing and manufacturing houses are so anxious for business that they are willing to sell to anyone at dealers' cost. The established contractor and dealer with his high overhead expenses of doing business in a proper manner cannot compete with this sort of competitor that sells for a meager five or ten per cent profit and puts in his time at an average day-laborer's wages. It there was the degree of honor or respect for the unwritten law that exists in either the hardware or lumber lines, there would be no need for licenses. Again, this business is made the kicking post for all sorts of local legislation. For instance in our own city our occupation tax is $30 per annum; all the legitimate dealers would be willing to pay $500 per annum, if there was any real protection connected with it. With the present-day facilities for traveling and the ability to cover a great deal of ground rapidly, a state license does little good as state lines are obliterated.

Herman Andrae Electrical Company, Incorporated, Milwaukee, Wis.

After studying the Massachusetts act, which requires the licensing of electrical contractors and electricians, we doubt whether licensing as required by this act would be effective in eliminating the so-called "curb-stone" or "basket" contractors. Such elimination might be effected by high licensing and strict adherence to the code. The Massachusetts code calls for an examination fee of $25 and an annual fee of $15 thereafter; in Milwaukee all contractors must at present pay $2 per month to the city or $24 per year. This fee, already considerably higher than that exacted in Massachusetts, has had no effect in decreasing the number of "curb-stoners" nor their activities.

Adequate inspection of all electrical installations should tend toward a more uniform and better grade of wiring with less of the extreme price variation found on jobs covered by loose specifications and light supervision. In Milwaukee, for instance, the effect of the new city ordinance calling for conduit work in all buildings has been to decrease the variety of material and fittings in stock, to make simpler the estimating of a job, and thus to make the prices of all bidders on a job run more uniform. When all "curb-stoners" have to figure on the same material and type of wiring as other contractors do, they can no longer do a cheap and low grade of wiring. This enforced standard of wiring will eliminate the "curb-stone" contractor in that he will either drop out of business, or that he will, by virtue of improved wiring work and honest prices, no longer be a "curb-stoner."

Licensing, whether by state or by municipality, will limit the business activities of the licensee to the territory controlled by the licensing body. This consideration argues strongly against city or county licensing—if the holder of a license in Milwaukee, for instance, could not do business in Racine or Madison without obtaining other licenses in those towns. A state license would guarantee to its holder the privilege of doing business anywhere within that particular state, and would thus satisfy the demands of the majority of electrical contractors.

There is, however, an appreciable number of contractors whose business covers a wide area, who may engage in electrical construction work in six or eight different states each year, and who could not be expected to pay a high license fee in each state wherein they do business. This class of contractors, which caters to large jobs, would be little bothered by "curb-stone" contractors in the first place; but, as the result of the licensing, the latter would nevertheless have either their business activities hampered or their expenses increased. It should be apparent from this that no licensing of contractors on the same basis would be equitable to all, and that licensing in itself should not be regarded as a complete and effective means toward eliminating "curb-stone" contractors.

OPINIONS OPPOSING LICENSING

Statements of Contractors Who Candidly Believe That Licensing Is Inadvisable

Electrical Supply Company, Madison, Wis.

So far as I am concerned, I do not favor the licensing of the wiremen or contractors. We find that the license held by the contractor puts a stamp of approval upon his work, regardless of his ability to fulfill a contract and do the work properly in the eyes of the layman. The ordinary customer feels that he has washed his hands clean and has done all he can do when he hires a licensed contractor and the job is approved by the city inspector.

While I might add that this is a step in advance and, taking all in all, is better than no license or no inspector, it is far from ideal, as it simply places all classes of contractors in the same class. I think it would be the same if we licensed the wiremen. It would put all classes of wiremen on the same basis, and, while it would have a tendency to eliminate the college student and a few other undesirables, it would not eliminate a genuine curb-stoner (by which we mean a fellow who earns his living at all times by doing electrical work).

We find that city officials are much more lenient to licensed curb-stoners than they are to the so-called "bigger" fellows. If the latter make a complaint, city officials think it is only because the big fellow wants to do away with the smaller fellow and they will pay no attention and take no action. Some of our curb-stoners, who are licensed, will accommodate a fellow who has hired an outsider to do his work, by taking out a permit for him, when in fact, this curb-stoner has not touched the work and knows nothing about it. The city attorney claims the city has no interest in it only so far as its inspector goes. If the inspector inspects the work and approves it, it doesn't seem to have any effect upon the city officials whether the man who did the work is licensed or not.

Louis L. Corry, Davenport, Iowa.

Curb-stone competition is generally considered as competition which comes from a contractor or person who does not maintain an established place of business, or in other words a person whose place of business is located mainly on the curb-stone. But in actual practice there are many persons who maintain a place of business that are truly curb-stoners, because in my opinion a curb-stoner is one who does not get a legitimate profit. He may maintain the finest store or shop in town and do the greatest amount of business in a year, but "all is not gold that glitters," and if this contractor does not show a reasonable profit at the end of every job he is just as much a curb-stoner as the fellow who thinks he can do business always cheaper than the other fellow because he does not maintain a shop.

As there is evidently a fault somewhere we must find it and the reason for the fault. What is the main reason for curb-stoning? It is all summed up in a few words. Lack of knowledge. Trace all of the cases back and you will find that this is the reason for curb-stoning and the one who does curb-stoning generally quits it when knowledge comes. The curb-stoner as a rule is first made by the general contractor, who I am sorry to say seems to have a better knowledge of what material plus a wage of about two dollars a day will amount to than the curb-stoner, who is going to be wonderfully prosperous because he is in business and the general contractor is going to give him all of his work. From the general contractor it is but a step to the architect who has a little more knowledge than the general contractor because he can say less in more words and also knows enough to require a bond from the curb-stoner to protect his own interests. He realizes that the curb-stoner does not know what he is up against when he hands in his successful bid.

Now for some methods to combat these conditions. The first temptation is to try and beat the curb-stoner at his own game. The next step in trying to beat out the curb-stoner is the license and bond method; this is a sort of force method, one where the contractor is trying to have a law passed for his own benefit. In return he will pay special fees to the authorities for the privilege to try and throttle his competitors. As a matter of fact he does not get protection from cheap competition, but is cast into a common pool of those who have passed an examination, and paid a license and whose work will have to pass inspection. Look at some organizations that pay a high license, file high bonds, pass examinations for both master and journeymen, have closed conditions, yet they have the keenest competition, there being more shops with fewer men making money. It is obvious that the curb-stoner cannot be eliminated through force.

How shall we eliminate the curb-stoner then? The first thing to remember is that we as individuals are responsible for this condition. Have we actually made a study of curb-stoning or haven't we often done a little curb-stoning and said "I bet they will lose, if they take this job," knowing full well that we did not see a way to make a profit ourselves. If you wish to cut out these conditions you must meet your competitor in absolute good will and confidence. Do not expect him to do it. If he is a stranger get acquainted some way.

To contractors who are troubled with workmen curb-stoning I would suggest that you take to exchanging men with your competitor when one or the other needs men.

To stop the public running to curb-stoners, try getting interests of a public nature outside of your business. This broadens your view and, while you may not know it, brings you friends who help to down the curb-stoning spirit in yourself as well as in others.

A. Engelhardt, East Stroudsburg, Pa.

If the great Creator of mankind had provided each individual with a free-lunch counter and had made it possible to obtain all the other necessities of life without effort, then taxes, assessments and licenses might be condoned, but as long as man is compelled to keep life in his body through the sweat of his brow, it does not behoove any individual or body of individuals to concoct or devise any system or method that will in any way interfere with any other individual's attempt to make a living. The requiring of wiremen or contractors to be licensed by either the state or the municipality is nothing but a scheme to benefit the few at the expense of the many.

Bend all efforts towards obtaining a system of uniform inspections under the supervision of the state, supported by the state, the board of underwriters and the lighting companies, forbid the latter from connecting their services until a certificate of approval has been issued; require all contractors to register (without fee); finally keep the thought "Help, don't hinder" uppermost in your mind and you will soon have the "curb-stone" evil eliminated.

J. G. White Conducts Campaign to Encourage Government Efficiency.

J. G. White, president of J. G. White & Company, New York, and prominent in electrical circles, has submitted to various congressmen at Washington, the following interesting communication, which is of national significance.

My attention has been called to the Tavenner Bill (H. R. 8665), prohibiting time studies and other methods looking toward efficiency of those engaged in government work; also to the Van Dyke Bill (H. R. 8677), the object of which apparently is similarly to discourage possible increased efficiency in the Post Office Department.

I understand that similar legislation in the way of riders, or otherwise, may be attached to the Post Office Appropriation Bill, the Naval Appropriation Bill, Army Appropriation Bill, and Fortification Appropriation Bill. I earnestly hope you will do all that you possibly can to defeat any such pernicious and foolish legislation.

As the active head of a large engineering and construction organization in this country, and also of another organization which we have built up, with headquarters in London, to do foreign work (the head men of which are Americans, but most of the staff being British, French, Swiss, Dutch, etc.), I have some appreciation of the importance of this general subject.

At the present time the United States is enjoying exceptional prosperity, due largely to our exports of munitions, together with other exports which are made possible, or at least largely helped, by the fact that the nations at war are unable to compete for this foreign business in many lines.

After the war is finished there are many evidences to indicate a probable prolonged struggle for export business. On the part of the nations at war, the maximum exports will be of the utmost importance to enable them to take care of their huge debts and rehabilitate their financial systems.

Before and during the war Germany had, and has, shown wonderful efficiency, particularly in all lines of manufacture. This has been due largely to the remarkable encouragements which were from time to time given by the Kaiser and the German Government generally to increase efficiency in all lines of German endeavor, particularly those which would increase German exports.

I am sure that you earnestly desire the continued prosperity of the United States. While our unparalleled natural resources tend to assure us prosperity, irrespective of our own efforts and efficiency, yet this will carry us only to a certain extent, and beyond that the nation must prove its efficiency or its prosperity will be largely curtailed.

Considering all of these and other conditions which might easily be mentioned, it would seem to be extremely important that our Government should, in all reasonable ways, encourage efficiency in all directions. The legislation above referred to has absolutely the opposite effect. If efficiency in government departments is discouraged or prohibited, certainly this must reflect on efficiency in private establishments, and tend to interfere with the prosperity of the United States.

A good example of the pernicious effects of legislation inspired by such forces as are apparently back of the Tavenner Bill, may be seen in the La Follette, or Seaman's Bill, the effect of which has been to hand over to the Japanese practically the entire control of the shipping of the Pacific Ocean, and almost the entire carrying of the Oriental imports and exports of the United States.

If the Government, by the passage of the Tavenner Bill, or other similar legislation, is to discourage or prevent efficiency or the development of American industries, it must inevitably materially increase the seriousness of the economic situation which will confront us after the close of the European war.

You, of course, know that exports on a large scale have been possible, in spite of the extraordinarily high wages paid in this country, only because of the high efficiency of our highly paid labor.

Should Electric Merchandising Be Restricted?

A Brief Discussion of the Advisability of Restricting the Sale of Electrical Goods to Electrical Dealers

THE great strides achieved in almost every branch of the electrical industry have steadily broadened the market for electrical goods. This is true not only of the wholesale market, but likewise of the retail trade. This development is due to a considerable extent to the aggressiveness of electrical companies in making the public aware of the advantages of electrical methods and appliances, and to the gradually broadening knowledge of electrical affairs on the part of the public in general. The magic connected with things electrical is itself a great incentive to purchase electrical goods.

One aspect of this broadening market is the tendency for the retail sale of electrical goods in stores conducted by persons that are not electrical dealers. In this group are department stores, hardware dealers, plumbers and others whose knowledge of electrical matters is superficial, or at any rate so unreliable as to make it questionable whether they can sell electrical goods intelligently.

This growing tendency is looked upon with alarm by a number of interests. Naturally, those most concerned are retail electrical dealers already established in business. Others fear that the promiscuous sale of electrical goods in a rather unintelligent way, by the broad distribution of inferior and unsatisfactory products, will create so much dissatisfaction as to seriously react upon the high repute that things electrical now possess.

The question "Should nonelectrical dealers sell electrical goods?" is attracting the attention of electrical retail dealers since the practice has become more common for department stores, drug stores, hardware dealers, plumbers, etc., to sell at least the more common electrical appliances.

Among objections to this practice is the unfair competition with legitimate electrical trade through disposing of cut-price, inferior, and in many cases, seriously defective and hazardous articles, which give a bad repute to the industry in general and retard its proper development.

On the other hand, the disadvantages of a broadening sale of electrical goods are stated by those who are in favor of this policy as being of minor importance and self-corrective. It is suggested that simple educational work with these miscellaneous merchants quickly instructs them in the essentials of successful electrical merchandising. The public is also becoming better acquainted with electrical matters.

Various solutions are suggested, especially co-operation and progressive business methods. The local dealer should give publicity to the superior service he provides and carry a complete stock of all high-class goods for which there is demand or possibility of creating demand. With such facilities and service he can more readily command the co-operation he desires.

A number of brief statements from representative electrical dealers indicate the variety of opinions held on this problem.

On the other hand, many interests feel that this tendency is an inevitable one and that the disadvantages connected with it can be overcome by education and by natural economic means. In view of this doubtful status of this business, it is well to review the entire subject and find out the advantages and disadvantages connected with this practice and how the latter may be overcome, if means to this end are available.

Objections to Sale of Electrical Goods by Nonelectrical Dealers.

Several objections have been urged against the practice of permitting miscellaneous merchants to deal with electrical goods. One of these, which is the one naturally uppermost in the minds of real electrical dealers, is that it sets up serious competition with their efforts to establish and maintain a reputable business. This objection is not so much to the creation of competition itself, but to the creation of that undesirable competition which involves the sale of inferior goods at specially low prices. Connected with this is the more important objection that on account of the lack of knowledge of the nonelectrical dealer of the real requirements of electrical merchandise he is unable to purchase intelligently and discriminatingly, and consequently, even though he may not intend knowingly to deal in unsatisfactory goods, he becomes the prey of manufacturers and jobbers who are glad to dispose of wares that they have not been able to market because of their inferior or altogether unsatisfactory character. The result has been that a great amount of electrical supplies and appliances that no one else would accept have been dumped on department stores and other miscellaneous dealers, and when these have come into use among the unsuspecting public much dissatisfaction has arisen and numerous cases of serious accidents due to the poor quality of the material have resulted. For instance, cheap and poorly insulated flatirons have been sold at ridiculously low prices which have gone to pieces after a very short period of use. Lamps and other accessories entirely unsuited for the voltage of the circuits on which they were going to be used have been sold. The result has been considerable danger to both life and property from the general distribution of such defective goods.

Attitude of Those Who Favor the Broadest Trade.

In the class of those who favor not only practically unlimited trade in electrical goods of all kinds, but a continual broadening of the entire electrical merchandising field may be put in general the manufacturers, jobbers and central stations, because naturally, like any other business, they wish to create as large a market for their wares as possible. This does not mean, however, that all these interests have indulged in the practice of indiscriminately broadening the market among nonelectrical dealers. Those, however, who believe that the market is bound to be extended to dealers that are not distinctly electrical feel that, on the whole, this is a tendency that should be encouraged because with the sharp competition that exists the electrical industry can keep itself in the forefront only by the most aggressive and progressive new business methods. The great stimulus that has been given to the central-station industry, for instance, is due to the adoption by the more progressive companies of progressive ideas of business development.

The manufacturers and many of the leading jobbers, likewise, have greatly extended their publicity work and through national advertising and other methods have attempted to create a much larger demand for electrical appliances of all kinds. Many of them are ready to cooperate with the local dealers in every way possible to throw the business created by this national advertising in their direction. However, if the local dealer cannot keep abreast of modern business methods, then he should not offer any opposition to other merchants who are ready to avail themselves of the opportunities.

A prominent electrical dealer, who is at the head of a

large electric shop operated as an auxiliary by one of the largest central stations, stated that the disadvantages connected with this broadening of the electrical market are inconsequential and can readily be remedied by simple methods. For instance, the managers of a department store that established an electrical department were advised that the flatirons they were marketing were entirely unsatisfactory. If these continued to be sold the public would quickly return the inferior articles and these "come-backs" would quickly teach the merchant that inferior goods cannot be marketed successfully. He also stated that with the rapid increase on the part of the general public, and particularly on the part of the rising generation, of knowledge of electrical matters, the danger of buying electrical goods that are unsuited to requirements is diminishing. Thousands of young persons are being turned out of our high schools and colleges annually who have a pretty good general knowledge of electricity and who cannot easily be imposed on to purchase unsuitable goods. He also felt that by increasing the sale of electrical appliances of all kinds the entire industry, including contractors and local dealers, is benefited because there is increased demand for more extensive wiring and for the purchase of miscellaneous electrical supplies that are not as a rule carried by such department stores and hardware dealers as have established electrical departments. These, as a rule, handle only the staple articles, such as flatirons, toasters, percolators, and other well-known appliances. The hardware store is the material place to which people turn when they wish to purchase household utensils.

Attitude of Those Who Favor Restriction.

Local electrical dealers who have established a business in the selling of fixtures, lamps, appliances of all kinds and miscellaneous electrical supplies bitterly oppose the policy of many manufacturers and jobbers of placing their products in the hands of dealers who have no training in electrical matters. It has been found that such dealers almost invariably dispose of their wares at ruinous prices, especially so in many cases in the hope of drawing trade to other departments of their general business.

The legitimate electrical dealer, and especially the one who is also a contractor and ready to do wiring and general repair work, wants to give the best kind of service to all his customers. This involves handling only the most satisfactory and therefore naturally rather costly goods, and the readiness freely to advise regarding what appliances and supplies are reliable and best suited for different requirements. Such a dealer is the logical center in his community for the sale and taking care of all its electrical wants. He is ready to wire premises, to supply the necessary fixtures and auxiliary appliances, to take care of minor repairs and to advise generally regarding electrical matters. In view of the still general lack of electrical knowledge of the public and especially the confusion regarding volts, watts, amperes, etc., he is ready to supply those things that are suited for the purpose and therefore he performs a very valuable service to the industry generally and to his community.

Naturally he feels that manufacturers, jobbers and central stations should recognize this service and co-operate with him in every way to increase its value. The local dealer who is giving such service therefore resents the competition of all who are hampering him in his work. He feels that the injury done in the community by the indiscriminate sale of shoddy goods, just like the injury done by defective wiring, is a permanent injury which really retards electrical development.

Solutions of the Problem.

The problem is so complex that no single, simple or completely satisfactory solution has been advanced for it. It is generally agreed that legal restriction of the sale of electrical goods to electrical dealers only is not feasible. It would involve the assumption that the sale of all electrical articles was hazardous, just as the sale of gunpowder or drugs; such an assumption would be suicidal. Among the solutions suggested is more free and general co-operation between the different electrical interests—manufacturers, jobbers, local dealers and central stations. This matter has been urged for a great many years, especially by those who feel that each of these interests has its own particular field of legitimate activity and should not encroach on the field of the others. There is no question but that co-operation undertaken in the proper spirit is a most effective remedy. At least two national organizations already exist in the industry, namely the Society for Electrical Development and the Jovian Order, that have as one of their corner stones, the idea of co-operation, and have already accomplished a great deal in this direction.

A feeling has also existed that this problem has its origin in the lack of progressive business methods on the part of many local dealers and its solution therefore rests with them primarily. A large number of small towns, particularly those where there are municipal lighting plants, are very backward in their electrical development. In such places it is difficult to purchase electrical appliances and supplies and such contractors as are engaged in business as a rule handle only a few fixtures.

This problem has been attacked very successfully in the Pacific Coast States and particularly by the establishment of the general practice of contractors maintaining good electrical stores where all kinds of appliances and supplies as well as fixtures can be purchased and minor repairs taken care of. In these states the co-operation between the various interests has also been carried out more completely than perhaps in any other section of the country.

It is doubtless true that, if the local dealer will put in a good stock of such general supplies as are in demand and will avail himself of and participate in the advertising and general publicity work which is freely offered him by manufacturers, jobbers and central stations, he can stimulate his business decidedly and very remuneratively. He should let the public know that he can provide superior service. In many cases he can even co-operate with hardware dealers in the suburbs and adjoining small towns by putting a stock of his goods in their stores and instructing them how to sell them intelligently; in return the hardware dealer should act as his agent in taking orders for wiring, repair work, etc.

Opinions of Dealers on the Subject.

On account of the considerable divergence of views on this subject, it was thought desirable to obtain from representative electrical dealers expressions of their opinions. Letters were written to a considerable number of dealers asking their opinions, and the following are typical of the general run of the replies received. It will be observed that various solutions are recommended, but no general consensus of opinion on which is the best can be said to exist.

WHERE THE BLAME IS PLACED

Electrical Dealers Protest Against the Over-Zealous Efforts of Manufacturers and Jobbers

The F. M. Grant Electric Company, Cleveland, O.

We as individuals and through the local and state associations have been trying to combat this evil for several years, but with the vast amount of literature put out by the manufacturers advocating and encouraging department stores, hardware dealers, plumbers, etc., to handle their goods, we have been unable to accomplish any reform along this line. The same mail that brought your letter brought the bulletin of a lamp manufacturer in which there is an article entitled "Hardware Dealers as Distributors." This is only one sample of the many articles put out by the manufacturers.

Roseberry-Henry Electric Company, Grand Rapids, Mich.

This question is very hard to answer. The root of the trouble

seems to be with the manufacturers and sometimes the overzealous jobbers to get business.

Marshall Electric Company, Marshalltown, Iowa.

An item of importance at this time is the way in which some of the manufacturers put out their catalogs. You can drop into any hardware store today and you will find various catalogs of electrical equipment and appliances which are mailed to these people the same as to the electrical contractors and dealers. This is entirely wrong. Do wholesale jobbers or manufacturers of hardware send us their catalogs and discounts? If so, in our thirteen years' experience in the electrical industry we have never seen it. Why then should they receive ours? If there is any information that a hardware dealer wants on electrical equipment or appliances he should obtain same through the electrical contractor and dealer, if there is one in his vicinity who is live enough to take care of his business. It is the manufacturers' and jobbers' duty to refer these people to their nearest reliable contractor, who would be glad to co-operate with them, instead of sending them quotations and catalogs on equipment they know nothing of.

C. C. Bohn Electric Company, New York, N. Y.

The sale of electrical appliances and supplies by nonelectrical dealers, such as department stores, plumbers, hardware dealers, etc., is one that interests us. There is no question but what the business of the legitimate electrical dealer is affected to some extent by the intrusion of the outsiders. As to how this can be prevented, we are at a loss to suggest a remedy. We doubt very much whether the manufacturers can be looked to for any assistance in this direction. Even if the manufacturers were selling to assist, the intermediate jobber would still have to be considered, and we believe it is the jobber who is very largely to blame for the introduction of electrical appliances in department stores, drug stores, etc. As to educating the public, the use of suitable articles in the various national magazines put out as interesting news matter, in a manner similar to the work done by the Society for Electrical Development, may have some value. But the fact remains that an article which is advertised nationally by the manufacturer and is offered at a cut price by the corner drug store will nevertheless be purchased by the public despite any protest or attempts at education that may be undertaken. The legitimate dealer, if he is also a contractor, of course, has the advantage of being in a position to recommend the correct application and installation of the appliances to the prospective purchaser, and it is this intelligent service which carries weight with a great many people.

SUGGESTS APPROVED APPLIANCES

Movement Suggested for Sale Only of Appliances Approved by Underwriters' Laboratories

The Enterprise Electric Construction Company, Cleveland, O.

As the manufacturers and jobbers have placed electrical appliances and supplies in department stores and sold them to plumbers and hardware dealers, and as such dealers are now established along these lines, also as different conditions exist in cities of the first class than in smaller ones and in towns, it is rather difficult to offer a solution of the problem to divorce the sale of this material from them. We had taken the matter up some time ago with the Electrical League of Cleveland, which has a committee to pass on the merits of electrical appliances and on approval of the same. The articles would be listed and the dealers provided with stamps by the Electrical League of Cleveland, which would be placed on the article, and the public fully advised, through the newspapers or otherwise, as to these dealers and recommended only to purchase such articles, and in that way eliminate a large number of undesirable and harmful appliances that are now on the market and which hurt the legitimate business of those well established.

We believe that the time has come when all electrical appliances should be sent to the Underwriters' Laboratories at Chicago to be approved. On approval of same they should furnish the manufacturers with approval stamps to be placed on all appliances sold. This in a measure would protect the public, and also gives the dealers some protection, and it would bring up the standard and price and eliminate the specially made goods to be sold at cut prices, which are the biggest hindrance to the electrical dealers. Department stores and other nonelectrical dealers only buy the low-cost special articles to advertise and get the business they desire in other departments.

PUBLICITY ADVOCATED

Dealer Should Let People Know About the Superior Service He Can Give

Ridgway-McSherry Electric Company, Freeport, Ill.

So long as most people look at the price and not the quality of electrical articles, just so long will they buy the cheaper article whether same be sold in a boiler factory or a cemetery. The only way to fight the cheaper sort of competition is to persistently advertise and talk the fact that the electrical dealer alone is able to intelligently judge the quality of the goods he sells. The electrical dealer himself, to make this statement good, must not sell junk in competition with cheap stores and he must refuse to handle any line which is customarily handled by cheap stores.

VALUE OF CO-OPERATION

United Effort of Strong Electrical Organizations Can Work Out Satisfactory Solution

J. T. Marron, of Electric Construction Machinery Company, Rock Island, Ill.

This is surely a very live subject and one that we are all deeply interested in. The solution is quite a problem. We feel that the only chance of working it out is through the united effort and co-operation of the National Electric Light Association, National Electrical Contractors' Association, different electrical manufacturers' associations, electrical jobbers' associations, and Society for Electrical Development. By the united efforts of these bodies, I believe the problem could be solved, at least to a very large extent if all reputable articles were consigned to the different dealers for sale.

NEED FOR PROGRESSIVENESS

The Remedy for the Problem Lies Principally in the Hands of the Local Dealer Himself

W. T. Ball, of Tri-City Electric Company, Moline, Ill.

There is considerable to be said in regard to department stores, plumbers and hardware dealers selling electrical appliances. We believe that no one is to blame but the contractors themselves. The average electrical contractor is a man who can not, will not or does not look much beyond the hole he is boring or the nail he is driving. Why is he boring holes and driving nails and still pretending to be a business man? If he was capable of running a business he would not be doing all the work with his hands, but would be using his brains and would at least try to be a merchant and carry some of the electrical devices in stock instead of allowing his customers to buy them at department stores. If he amounted to much in his own town, he could go to the department stores and ask them to keep "hands off" of this end of the business and they would do it. If he could not do it alone, he could join one of the organizations in the electrical field who would help him. You cannot expect people to buy from you, if you have not the goods to sell to them.

Interpoles, Their Principles and Usage

An Explanation of the Theory and Action of Interpoles With Illustrative Diagrams—Effect Upon Brush Position

By Gordon Fox

THE use of interpoles, otherwise termed commutating or regulating poles, is becoming daily more extensive. This growing usage renders desirable a general understanding of the interpole, its action and peculiarities, together with a knowledge of troubles which may arise due to its presence.

The two foremost limitations of the output of direct-current motors and generators are commutation and heating. In many cases commutation is normally the limiting factor. The interpole is a means for improving commutation. It therefore does two things; enables machines to be rated more closely with respect to heating considerations, and makes possible or more satisfactory the use of machines for work hitherto impossible or difficult of attainment because of sparking tendencies. This latter class comprises several divisions.

Adjustable speed over a wide range may be secured through field control if a motor be equipped with interpoles. Weakened field greatly accentuates the effect of armature reaction because the relative magnetomotive force of the armature is then greater with respect to the field. Formerly it was impossible to secure more than 50 per cent increase in speed above full field value because destructive sparking resulted. This usuage probably represents the foremost benefit secured from interpole designs.

The interpole, correctly proportioned, provides a fixed neutral plane under all ordinary loads. Its presence is therefore very beneficial upon all classes of machines, both motors and generators, which are called upon to handle widely varying loads. The brushes of simple shunt and compound machines must be set in a compromise position, correct for a single load value only.

The neutral position of an interpole motor is the same for either direction of rotation. Consequently for drives requiring reversibility, the presence of interpoles is advantageous. Railway, haulage, elevator and many other motors fall in this class.

The neutral plane of an interpole machine remains fixed, whether the machine operates as a motor or as a generator. The units in balancer sets for three-wire systems are called upon to operate sometimes as motors and sometimes as generators, consequently the addition of interpoles is beneficial. The neutral shift being of opposite effect upon motor and generator, the brushes of a non-interpole set must be located in an intermediate position incorrect for heavy loads. Commutation is thus a limiting factor of the capacity, and the addition of interpoles permits closer ratings.

Since the interpole retains a fixed neutral plane under all loads, a machine so equipped can carry greater overloads and for longer periods without detrimental effect. Such machines are therefore excellent where occasional heavy peaks are to be encountered.

As was previously stated, a machine operating under weakened field is more liable to sparking than a machine having a field relatively strong. Since exciters are usually operated at terminal voltages considerably below name-plate ratings, their self-excited fields are comparatively weak. Consequently the use of interpoles may here be beneficial. For the same reason motors operating from trolley lines subject to fluctuating voltage, sometime considerably below normal, may well be of the interpole type.

High-voltage machines are more liable to sparking than are low-voltage machines. The segment voltages are higher and the turns per coil greater, tending to high self-induction. The use of interpoles has enabled the 1200-volt railway system to be developed. The addition of interpoles to most 550-volt motors has greatly decreased trouble in that class of machines also.

The rapidity of reversal of current in the commutated coils of high-speed machines, together with the fact that good contact is difficult to secure, and soft, low-resistance brushes are desirable to avoid excessive commutator wear, makes machines of that type liable to spark. Interpoles are therefore commonly inserted in the design of turbine generators. High-speed motors without interpoles are more prone to commutation troubles than their slower-speed prototypes, but they are cheaper. The use of interpoles renders the higher-speed units equally reliable.

Incidentally, the interpole tends to improve speed regulation. Motors of this type are therefore particularly well adapted where extreme accuracy of speed control is desirable, such as for turret-turning drives in the navy. Also, machines whose output is proportional to motor speed may best be driven by motors which maintain their speeds closely under load.

With this variety of beneficial uses to its credit, the popularity and wide use of the interpole is fully warranted.

In order to illustrate clearly the functions which interpoles serve, it will be necessary to discuss briefly the principles of commutation. The purpose of the commutator is to conduct unidirectional current to and from coils passing alternate north and south poles and having generated in them alternating voltage. When these coils are directly under the main field poles the voltage is at its maximum. When they are midway between poles the voltage passes through zero and changes sign. The brushes bearing upon the commutator must span at least two bars, short-circuiting them. If the brush were so located that it spanned bars connected to coils in a strong field the resulting short-circuit current would be very great. But a brush spanning bars connected to coils passing through zero voltage causes very little current flow. For ideal commutating conditions the current in the coil should decrease at a uniform rate, reach zero when the commutated coil is at the center of the brush, and should build up in the opposite direction uniformly over the rest of the brush face. This would cause an even distribution of work current. This ideal condition is modified by two tendencies, armature reaction and self-induction. Armature reaction causes a crowding and shifting of the magnetism so that the midway position is not a zone of zero flux. Consequently there is a voltage in the coils whose bars are spanned by a brush and short-circuit currents flow across the brush face. The shifting of the field gives a tendency for the current to continue its original direction under the greater portion of the brush, reversing sign and building up at the last instant just before the coil and bar pass out from under the brush. The work current being crowded to one edge of the brush is added or superimposed upon the short-circuit currents there existing, so that a high current-density exists along the trailing edge of the brush. The sudden interruption of this current causes arcing and spitting as the bar passes out from under the brush. If we shift the brushes in the same direction as the field is shifted we can cause the brushes to bear upon bars connected to coils located in the shifted neutral zone. The degree of field distortion, however, varies according to the amount of load. Since the brushes must remain fixed they are located in a compromise position, shifted too far for no-load condition and too little for heavy loads. Shifting the brushes also modifies the characteristics of machines to some extent, motor speed being varied and also generator voltage.

The current in the armature coils of a direct-current motor

or generator is continually reversing. Each commutator bar passes alternately under brushes of opposite sign so that the current is going into or out of that bar alternately. A change of current in a coil causes an inductive kick such as occurs in a spark coil. The change of current intensity causes a self-induced voltage in the short-circuited coil under the brush. This self-induced voltage opposes the change in current value and sign, and tends to maintain the current in the direction in which it was previously flowing. This energy, stored through inductance, is dissipated in a discharge through the short-circuited coil and brushes, causing sparking. The effect is most marked in high-voltage armatures having a large number of turns in each coil with consequent high inductance. In order to counteract this self-induced voltage in the short-circuited coils, the voltage in those coils should be enabled to drop to zero and be built up in the changed polarity to help the change in current direction while the coil under the brushes is in mid position.

Armature reaction and coil inductance are similar in their effect. It is consequently possible to overcome both by a single means. The interpole supplies a commutating field approximately proportionate with the load and of proper sign to assist reversal of current in the coils under the brushes. The two functions are: (1) to prevent shifting of the neutral position with each load change by introducing a proportionate counter action; (2) to impress on the short-circuited coils a small voltage favorable to current reversal in order to overcome armature self-induction tendencies.

This action can best be considered in connection with Figs. 1 and 2. These illustrate typical "field-form" curves showing the air-gap distribution of magnetic flux of each of several fields. Curve A shows the typical distribution of the flux of the main field under no-load conditions. The flux is here symmetrically distributed under the main poles. Curve B is the flux due to the armature conductors carrying full-load current. This armature reaction has a distorting effect which causes the resultant composite field to appear as in curve C. In Fig. 2 curve D shows the distribution of the armature flux with full-load current in the armature but with the interpole disconnected. Curve E is the flux from the interpole alone under full-load current. Curve F is the composite of curves A, D and E, showing the resultant field form in an interpole motor under full load. This shows how the presence of the interpole iron modifies the armature reactive flux. Curve C, Fig. 1, shows how the brushes are in a zone of flux which tends to prevent current reversal. Curve F shows how the interpole counteracts the armature reaction and even sets up in the commutating sector a slight voltage encouraging the reversal of the current and thus neutralizing the coil self-inductance effect.

In the case of adjustable-speed motors the field-form of the main-field magnetism changes in value, though retaining its general shape, as the field is weakened to increase the speed. For a given load the armature magnetizing effect is about the same, but is now relatively stronger with respect to the weakened field. The ratio of armature to field effect being greater, the shifting tendency is enhanced. A weak field is unfavorable to good commutation except with interpoles.

The interpole must evidently have an effect proportionate to that of the armature and irrespective of the main fields. This is secured by connecting the interpole windings in series with the armature. The interpole iron is worked at a low degree of saturation, so that the magnetizing effect is closely proportional to the magnetizing current. With this arrangement the interpole flux and armature flux practically neutralize each other at all normal loads, regardless of the strength of the main fields. The shifting tendency being overcome, the neutral position remains fixed at the no-load or mechanical center regardless of load changes. With very heavy loads the interpole may become saturated but, since the main pole tips and the armature iron are also saturated under that condition, the shifting tendency is moderated.

It is evident that a definite polarity relation must exist between main-pole windings and interpole windings in order to secure correct action in aiding reversal of the current in the commutated coils. The current in the coils of a generator is of the same sign as the generated pressure. A coil leaving a north pole must enter a south-pole field to cause reversal of current. Therefore the interpoles of a generator are of the same sign as the next pole in the direction of rotation. The interpole is here a sort of advance pole to reverse the electromotive force and build it up before the coil enters the field from the main pole. In the case of a motor things are different. Here the armature current flows in opposition to the generated electromotive force. The main-field magnetism itself is always acting to stop the flow of current by building up a counter voltage. Therefore, we have to continue the effect of the main field over to the interpole field to cause the current to finally fall and reverse. The interpoles of a motor are thus of the same polarity as the preceding main poles. This can be viewed in a different manner. In a shunt motor we shift the brushes against the rotation to bring the commutated coil into the field of the preceding main pole. If we are to avoid this shift we must bring the preceding pole's field toward the commutated coil by making the following interpole of the same polarity. Likewise, in a generator we shift the brushes with rotation to improve commutation by bringing the commutated coil under the influence of the following pole. Therefore, the interpole is rightly of the same polarity as the pole following with the rotation. In a motor we shift brushes against rotation and make interpole polarity the same as that of the next pole against rotation. In a generator we shift the brushes with the rotation and make the interpole of the same polarity as that of the next pole with the rotation. Incorrect interpole polarity is not an infrequent trouble. If the arma-

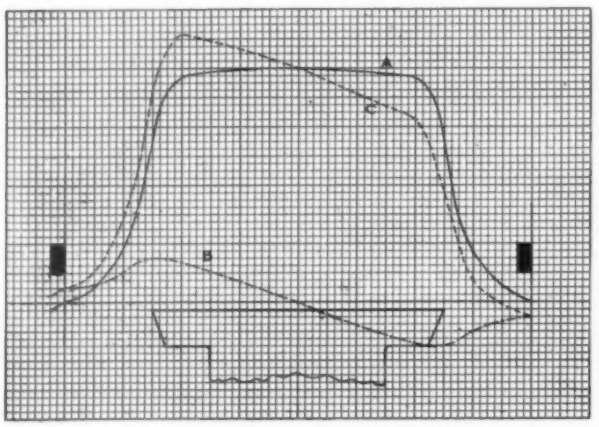


Fig. 1—Field-Form Curves Without Interpoles.

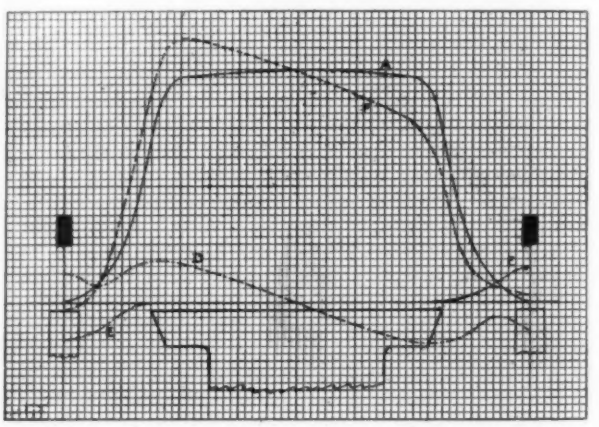


Fig. 2—Field-Form Curves With Interpoles.

ture leads of a motor are interchanged without reversing the interpole leads also, an incorrect relation results. Shifting of the brush rocker arm 90 degrees will cause this change, or throwing of the commutator end flange, as for side suspension, will have the same effect. In a generator the armature and field must have a definite relation in order that the voltage may build up. If the armature is reversed to meet this requirement, the interpole windings must be likewise reversed. Reversal of the armature always means reversal of the interpole also. One armature terminal may be permanently connected to one interpole terminal and the armature-interpole circuit considered as a whole (provided the brush position is not changed). A reversed interpole is apparent from the action of the machine. Without load the interpole is very weak and no bad symptoms may be noticed. As the load comes on, however, vicious sparking will usually result, accompanied by drop in speed of a motor or drop in voltage in the case of a generator. A deep humming noise is frequently noticeable also. Relative polarity may be tested by bridging from main pole tips to interpole tips with a small iron bar. Like poles do not attract the bar whereas unlike poles do attract it.

As previously stated, the brushes of an interpole machine should be located on the no-load neutral or midway position between poles. It is difficult to locate this point mechanically because of the throw of the coils. The easiest way to determine the midway point or symmetrical position is to run a machine as a motor, first in one direction of rotation, then in the other, measuring the exact speed for each direction. The brushes are moved until they arrive at a position where the speed is identical for both rotations. After this point is determined under full field strength, the field may be weakened (in the case of an adjustable-speed motor) and the operation

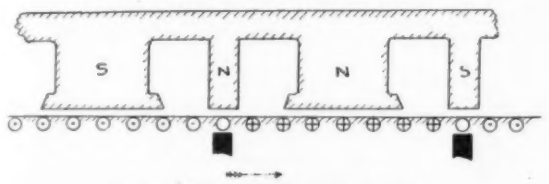


Fig. 3—Brushes in Middle Position.

repeated at greater speeds, retaining the exact rheostat setting. The operation is more sensitive under weakened field.

There are some machines, as, for instance, direct-connected generators, which cannot be driven as motors and reversed. Here the neutral point must be located in a different manner. There are several methods. One method is to observe carefully the characteristics of the machine by test. The action of an interpole generator is affected by the accuracy of its brush location, as will be later discussed more at length. A second method is to explore for the neutral with a low-reading voltmeter provided with "exploring leads." These are made from two pieces of No. 6 rubber-covered wire, taped side by side so that the projecting bared ends will span two adjacent commutator bars. When these terminals are placed on the commutator they indicate the voltage between segments. At each side of the neutral point the voltmeter will register a voltage between bars. On one side of the neutral the voltage will be in one direction, on the other side of the neutral it will be in the opposite direction. At the neutral point the voltage is zero. This method is easy to apply and is effective for the majority of cases, but is not entirely accurate since, if the brushes are off neutral, they carry the neutral with them to some extent. If the generator can be separately excited from the busbars and the armature rotated with the brushes lifted, the neutral can be found by the exploring leads as before but without any distortion because of incorrect brush position. The brushholders can be placed so that the center of the brushes will come over this determined location. They will then be correctly located.

A third method for placing the brushes, somewhat more difficult to apply, is the "kick" method. This is done with the machine at a standstill. The brushes are all lifted, the fields separately excited to about half normal strength and the current suddenly interrupted. This interruption causes an inductive kick in the armature coils. This kick is measured with a low-reading voltmeter. The voltmeter terminals are connected to auxiliary brushes having their edges ground so that only the center of the brush touches the commutator. These auxiliary brushes are placed 90 electrical degrees apart so that the voltmeter measures the voltage between adjacent studs. If the brushes are located in the midway position the voltmeter will show no deflection when the field is broken, because the voltages induced in the conductors on each side of the main-pole

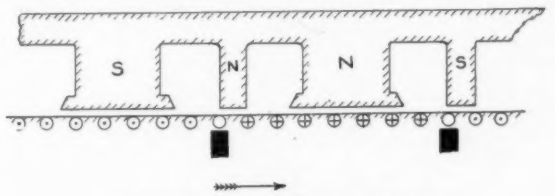


Fig. 4—Brushes With Backward Lead.

center line neutralize or counteract each other. If the brushes are off center the voltage in one direction is greater than in the other, and the voltmeter shows a deflection. Some armatures will not show zero deflection even on the neutral position because the winding is not perfectly symmetrical and divisible into even sectors corresponding to the pole span. Here it is necessary to obtain the minimum voltmeter deflection. In any case the neutral should be located with the test brushes in several different studs and the average neutral point used. This overcomes lack of symmetry in the armature layout. The kick method is quite extensively used, although to the writer it seems cumbersome and liable to error.

The interpoles of a machine are placed midway between main poles. The neutral position should be under the center of the interpoles. Let us see what will happen if the brushes of a generator are not placed to correspond with the neutral location. The action of the interpole with various brush positions can best be considered with the aid of Figs. 3, 4 and 5. In Fig. 3 the brushes are located in the true mid position. In Fig. 4 they are given a backward lead against the rotation, and in Fig. 5 they are given a forward lead with the rotation. When the brushes are in the mid position, as in Fig. 3, the coils spanned are acted upon by the flux from the main pole and by the flux from half of two interpoles of unlike polarity.

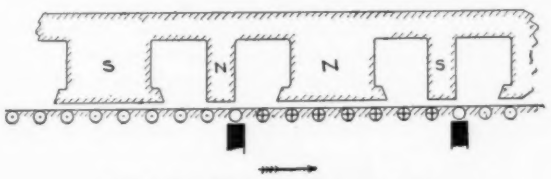


Fig. 5—Brushes With Forward Lead.

Since the interpole fluxes are equal and of opposite sign they do not have any resultant effect upon the armature voltage. Now let the brushes be shifted as in Fig. 4. The coils of a single span are now acted upon by the flux from one main pole and one interpole of like polarity. The strength of the interpole magnetization varies as the load, increasing with it. Consequently, as the load comes on, the voltage tends to increase and the effect is similar to compounding. Moreover, the armature magnetization is not directly opposed by the interpole. Consequently the interpole is not so effective in its counter action as it would be were the fields directly opposed. A stronger interpole is thus required if the brushes are given a back lead.

If the brushes are given a forward lead, as in Fig. 5, the conductors in a pole span are acted upon by one main pole

and an interpole of opposite polarity. Consequently the tendency is for the voltage to drop off with increase of load, because of the demagnetizing effect of the interpole. Also, with the brushes in this position, the interpole is less effective in producing good commutation and a relatively stronger winding is required. Thus both the interpole turns and main series turns must be increased if the brushes are given a forward lead.

The action of the interpoles in affecting the speed of motors having the brushes off neutral is similar to the effect on the voltage regulation of generators. With backward lead, against rotation, the main field and interpole field acting upon a span of conductors are of opposite polarity. With forward lead they are of like polarity. With either position the effectiveness of the interpole in providing good commutation is diminished. With backward lead there is a decided tendency toward racing and instability, since the speed tends to rise as the load increases. With forward lead the speed regulation is poor and sparking is quite probable. Interpole motor brushes should be very accurately located to secure best operation. Particularly in the case of adjustable-speed motors is correct brush position important. Under weakened field the magnetizing or demagnetizing effects of the interpole are relatively greater and the action consequently more marked.

Even with correctly located brushes there is sometimes a tendency for instability in interpole motors. One cause for this is the demagnetizing effect of the armature coils short-circuited by a brush and under the influence of the interpole flux. The maximum effect of the armature winding occurs at the points on the armature corresponding to the coils being short-circuited by the brushes. Therefore, if the interpole is overstrong the effect. It is a difficult matter to predetermine exactly the corcharacteristic. This is likely to start racing, since the action is cumulative. Early saturation of the field yoke due to the increase of interpole flux and demagnetization due to the cross magnetizing effect of the armature may also lend their influences.

As was earlier suggested, interpoles should have a definite proportionate strength in relation to the armature magnetizing effect. It is a difficult matter to predetremine exactly the correct interpole winding. Therefore machines, except standard repetitive designs, are often arranged with excess turns. Under test the winding is shunted with resistance wire and the relative strength of the fields thus controlled. The procedure is about as follows for a motor. After the brushes have been correctly located by the reversibility test, full load is thrown on the motor and the speed taken. If the speed is higher than no-load speed the interpole is too strong. If the speed drops more than three per cent between no load and full load, the interpole is rather weak. If the interpole is overstrong, particularly if the test is made with weakened main fields, the motor will likely commence to race and hunt. A German-silver or other shunt is then connected across the interpole windings, and the speed regulation again tried. This process is repeated with different resistances until the motor retains approximately the same speed at all loads, preferably dropping a little under load to insure stability. This test is most accurate if finally made under weakened field conditions.

It requires experience and judgment to estimate correctly the proper shunt resistance to place in parallel with an interpole to adjust its value. If it is found difficult to secure the proper value by the cut-and-try method, the interpole may be separarately excited through a rheostat and the proper interpole current value determined with full-load current on the armature. The resistance of the interpole being known or measured, the shunt may now be calculated, taking into consideration the proper current capacity in making the selection. In applying this method care should be exercised to break the interpole circuit when the main circuit is opened to stop the motor. If this is not done, the voltage generated in the armature revolving in the interpole field will cause flashing at the brushes which are displaced 90 degrees with respect to the interpoles as main poles.

A generater's interpole cannot be adjusted in the same manner as that of a motor. Here the exploring leads previously mentioned may be used again. The brushes being located on the no-load neutral position, a load is applied and it is noted whether the tendency is for the neutral to shift with or against the rotation. If the interpole is too strong, the full-load neutral will be in a direction against the rotation. If the interpole is too weak, the neutral will shift in a direction with the rotation, just as it does in a non-interpole machine, but to a lesser degree.

There are some disadvantages incident to the practice of shunting interpole windings with a resistance. If the resistance be a simple non-inductive one the current division between interpole winding and its shunt may not always be proportional. The interpole winding is quite inductive and consequently has a choking effect. When a sudden increase in load appears, the tendency is for the resistance shunt to assume the burden of the increase for a short period, the interpole in turn relieving the shunt. The current builds up less rapidly in the interpole winding because of the inductive effect. Another factor is the short-circuited condition of the interpole winding. This winding has low resistance, as has also the shunt. The two form together a series circuit inclosing the interpole iron. This circuit, being closed on itself, acts as a damper to oppose changes of field strength.

These two factors working together cause a shunted interpole to act more sluggishly than one not so connected. This is particularly evident upon fluctuating loads. A partial preventive of this situation can be provided by winding the shunt on an iron core inductively. This encourages proportional current division and reduces the damping action somewhat. It might be mentioned in this connection that laminated interpoles build up more quickly than those of the solid type and are therefore particularly good for fluctuating-load service.

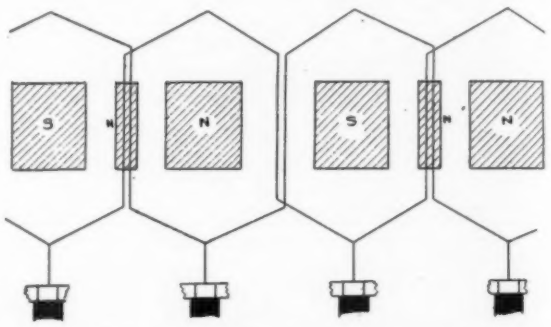


Fig. 6—Interpoles in Alternate Spaces.

Interpole generators to be successfully operated in parallel must be considered a little more carefully than ordinary compound-wound machines. This is because of the fact that the presence of the interpole may modify the characteristics of the machine somewhat. Interpole generators, as a rule, require less series-field ampere-turns for compounding, since the interpole itself tends to counteract the armature reaction, one of the causes for a naturally drooping characteristic. An interpole machine which is overcompensated or which has backward brush lead may even have a rising voltage characteristic without the compound winding. Such a machine will not operate well in parallel with another, since it will tend to "hog" the load. For successful parallel operation generators should tend to shirk the load; the more heavily loaded machine will then lay down and let its mate assume more of the burden. If difficulty is experienced in paralleling interpole generators, the compound fields should be temporarily disconnected and the voltage regulation tried with the machines connected as shunt interpole generators. If they have similar drooping characteristics the difficulty is not in the interpole. If either has a flat or rising characteristic its interpole must be shunted or the brushes shifted slightly forward, as the case may require, to correct

the condition. This, by the way, is one fairly satisfactory way to locate the brushes of an interpole generator, the fault lying in the fact that an overstrong interpole may be misleading. It is somewhat difficult to distinguish between incorrect interpole strength and incorrect brush position.

The number of interpoles used in a machine is a matter of design, depending upon armature coil throw, available space and many other factors. There may be either as many interpoles as main poles or half that number. The action is the same in either case. The reason may be best illustrated in connection with Fig. 6. This figure shows interpoles in alternate spaces only. The coils under commutation are shown diagramatically and it will be seen that one side of each of these coils is under the influence of an interpole. The idea is to generate all the commutating counter voltage in one side of the coil rather than partially in two sides, as would be the case were there as many interpoles as main poles. Consequently, where only half as many interpoles are used they must be provided with more ampere-turns per pole. It should be noted that with this layout all the interpoles are of the same polarity.

New Quarters of Merchants Heat & Light Company of Indianapolis Formally Opened.

The formal ceremonies at the opening of the new quarters of Merchants Heat & Light Company, of Indianapolis, Ind., were inaugurated at eight o'clock on the evening on July 11, with the hoisting of the American flag under flood light. A cornetist played the "Star Spangled Banner" with orchestral accompaniment. Then followed the lighting of all the store windows between Illinois and Pennsylvania Streets on Washington. The contrast between the darkened street and the brilliant illumination that followed the opening of the "Daylight Corner" was planned by the Merchants Heat & Light Company as a practical demonstration of the service given to cities by central power plants.

Immediately after the store lights were turned on, the gigantic sign surmounting the Merchants Heat & Light building flashed up. Then the lintel signs on the front and sides of the building were illuminated. Next came the flashing of flood light reflectors hidden behind the lintel signs, and last the switches connecting the interior circuits of the building were turned on.

The doors of the building were opened and a two-hour reception was given to the thronging public waiting outside. The visitors examined the arrangement of the building and the articles on display and took away with them suitable souvenirs provided by the company.

The new home of the Merchants Company offers in the opinion of the officers and departmental heads of the concern a signal new step in public utility development in this city. President Hugh H. Harrison and Salesmanager R. A. MacGregor take pride in the fact that the new home is at the intersection of the two most populous thoroughfares and in the heart of the city's business life. To get the most advantage from the location and the opportunities for effective demonstration of the manifold uses of electricity, the company intends to make its four story building a "Daylight Corner" in fact as well as in name. A mammoth roof sign with a talking feature only recently perfected will shed its light from above, while long lintel signs placed at the second floor line and reaching along the front of the building, will add to the brilliance.

The third step in showing the commercial uses of electricity will come in a system of flood lighting that will make every inch of space of both faces of the building as light as day. In addition, the front of the first floor will be devoted to the display of electrical devices of all kinds. This floor will be used as a great display window. Pedestrians will have an unobstructed view of the interior of the room and the cases. The scheme of illumination and the color effects both outside and inside of the building are determined with the purpose of giving the most vivid and effective illustration of the many uses to which electricity may be put.

Indianapolis Companies Donate Energy for Flood Lighting of Monument.

Celebrations incident to July 4 have taken the form of special electrical displays in many localities, and in practically all cases the local central-station companies participate in a purely public-spirited manner.

In Indianapolis, Ind., on July 4, the Soldiers' and Sailors' monument, dedicated to the heroes of the Civil War, was flood lighted for the first time and an impressive ceremony was held coincidently. Arrangements for the lighting were made some months previous by the Merchants Heat & Light Company, and also by the Indianapolis Light & Heat Company, and the entire installation was made at the expense of these companies. Energy was supplied without cost to the city and it is stated by R. A. MacGregor, sales manager of the Merchants company, that the lighting will undoubtedly be made permanent, the central station having agreed to furnish the necessary energy.

Soldiers' and Sailors' Monument, Indianapolis, on July 4.

Although these Indianapolis companies had no ulterior motives in participating in this affair, nevertheless, both were given columns of valuable publicity in all of the newspapers and were heralded as public-spirited corporations. Aside from this, the installations in Indianapolis will have a strong tendency towards popularizing electricity and further demonstrating to merchants and others the great advertising value of lighting.

The equipment installed by the Merchants Heat & Light Company to light the monument, consists of four banks of 25 250-watt Bryan-Marsh lamps in special projectors, located on the roofs of adjacent buildings. A few lamps were also placed about the monument to light the various fountains.

ELECTRICAL CONSTRUCTION

A Department Devoted to Problems Relating to the Installation, Operation and Maintenance of Electrical Equipment

INTERIOR WIRING SUGGESTIONS.

By Terrell Croft.

Bushing Conductors Entering Cabinets.

The method of bushing conductors entering a cabinet that is wired in accordance with the open or knob-and-tube method is illustrated in Fig. 1. The holes through

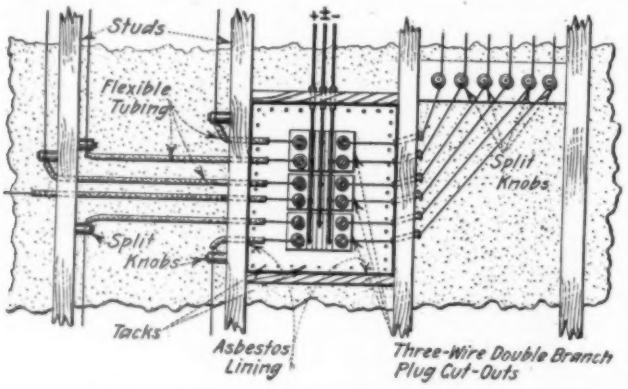


Fig. 1.—Method of Insulating Knob-and-Tube Conductors Where They Enter a Wooden Cabinet.

which the conductors enter the cabinet should preferably be bushed with porcelain tubes, as shown at the right of the illustration, but in dry places flexible tubing can be used, as shown at the left.

Flexible tubing may be used for bushing around conductors extending into metal boxes in knob-and-tube installations or for open work in dry places, provided it extends from the last porcelain support and is held in the box by an approved fitting. Fig. 13 illustrates one form of approved fitting to prevent the end of flexible tubing

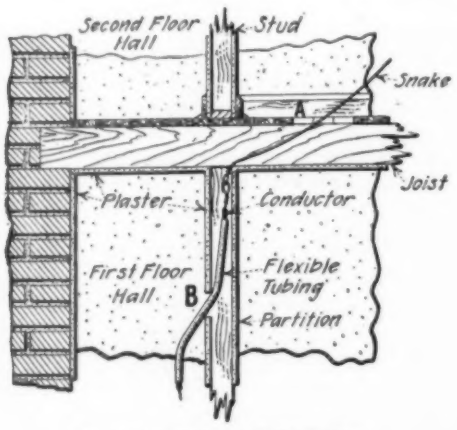


Fig. 2.—Example of Fished Run.

from pulling out of an outlet box. The steel stamping, Fig. 13, II, is held to the bottom of the box with a screw and is so arranged that, before it is clamped permanently in position, it may be pressed down so that it will "bite" into the tubing. A number of other devices of somewhat similar construction are manufactured for doing this.

Conductors should not be laid directly in plaster or cement or allowed to contact therewith. Both of these, and similar materials, are fairly good conductors, particularly when moist, and therefore may be sources of grounds or short-circuits if conductors are permitted to touch them. Furthermore, plasters, mortars and cements are alkaline or acid. They may, therefore, prior to drying out, act chemically on the materials insulating the conductors and impair or destroy them. In certain cases, chemical action of this nature has been sufficient to not only "eat away" the insulation on conductors but to perceptibly corrode the metal of the wire itself.

Proper Fishing of Conductors.

Where it is necessary to fish conductors, they should, where the wiring is in accordance with the knob-and-tube or open-work method, be incased in flexible tubing, provided the fished portion of the circuit is in a dry location. If the location is moist, flexible conduit or armored cable should be employed. Fig. 2 shows an example of an installation where the loom-incased conductors were, in a finished building installation, fished from pocket *A* to outlet *B*. The lengths of fished runs should be limited, because if a long run is fished, it is impossible to ascertain definitely whether the conductors that have been fished are safely installed. For example, they may be lying on a damp water pipe or in a moist location at some inaccessible point within a partition or ceiling space. The wires should always be incased in flexible tubing before being pulled in.

Twin Wire.

A twin wire is defined in the United States Bureau of Standards publication No. 37 as "two small insulated conductors laid parallel, having a common covering." Fig. 3 shows a piece of twin wire in a conduit. Since in wires

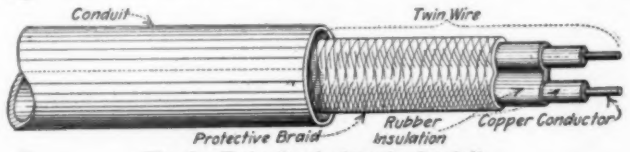


Fig. 3.—Twin Conductors in Conduit.

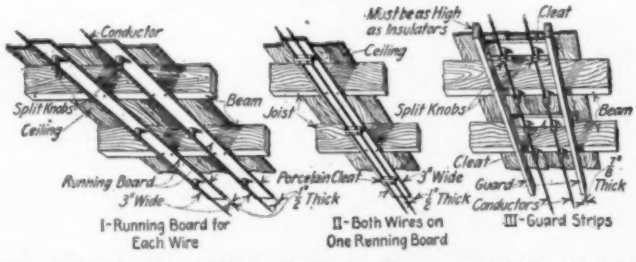


Fig. 4.—Guard Strips and Running Boards for Protection of Low-Potential Conductors.

of this character the conductors of opposite polarity are very close together, it is obvious that their use should be restricted to places where there will be little likelihood of their causing a fire if a short-circuit occurred between the two adjacent conductors. Another source of hazard lies in the fact that a fire originated by a short-circuit be-

tween the two conductors of a twin wire would rapidly follow along the combustible insulation on the conductors. Obviously, it would be unsafe to install twin-conductor circuits on knobs or cleats, either in exposed or in concealed locations because of the possibility of mechanical interference short-circuiting the wires. When a twin wire is installed within a conduit, the liability of mechanical interference is practically eliminated and furthermore, if a fire did start within the conduit, it would be confined within the tube. Flexible conductors are ordinarily considered necessary only with heating devices, pendent sockets, portable lamps, portable motors, stage plugs and adjustable brackets of certain types.

Protecting Conductors from Injury.

Guard strips and running boards are used for the protection of open-work wiring where the conductors must be

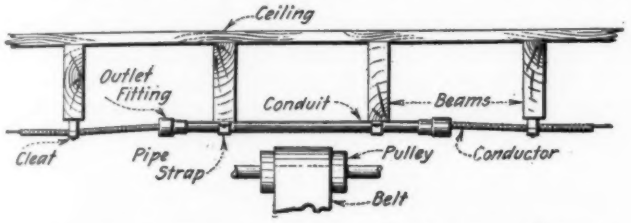


Fig. 5.—Conduit Protecting Conductors Crossing Floor Timbers.

carried on insulators supported on the lower edges of the timbers in locations where they might be subjected to mechanical interference. Such strips are ordinarily required in basements and in other places where the ceiling is low. In Fig. 4, I, each conductor of the circuit is supported on its own running board which should be at least as heavy as the dimensions indicated. At II both the conductors are insulated with cleats which are supported on one running board. At III guard strips are shown. Fig. 14 illustrates a method of supporting a running board from a ventilating or similar duct. Fig. 15 shows a "reinforced" running board for long spans, such as those encountered in steel-frame mill buildings.

Conduit used to protect conductors crossing floor timbers in exposed locations may be installed as suggested in Fig. 5. This method is probably the safest and by far

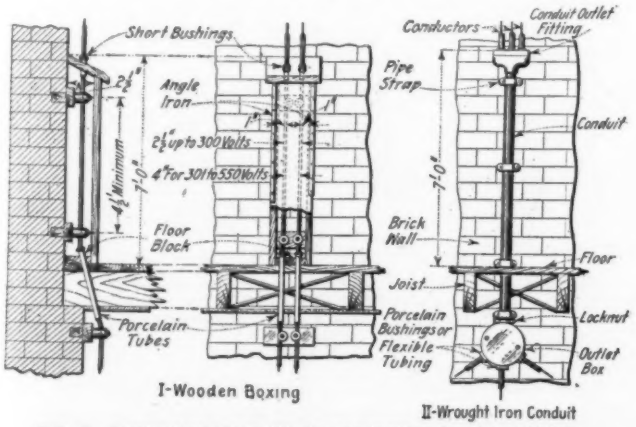


Fig. 6.—Protecting Open-Work Conductors on Side Walls.

the most satisfactory one in industrial plants or in other buildings where there is considerable traffic and liability to mechanical interference.

Protection for open-work conductors on side walls is illustrated by Figs. 6 and 7. The wooden boxing protection of Fig. 6, I, should be made of heavy material. The boards should be at least seven-eighths inch in thickness. Frequently, instead of building a box around two cleats fastened to the wall as shown in Fig. 6, it is desirable to first fasten a "backing board" to the wall and then build the protective boxing around this. The top of the boxing should be pitched as shown so that things will not be laid on it and so that it will not collect dust. A "floor block" at least two inches thick should be nailed on the floor at

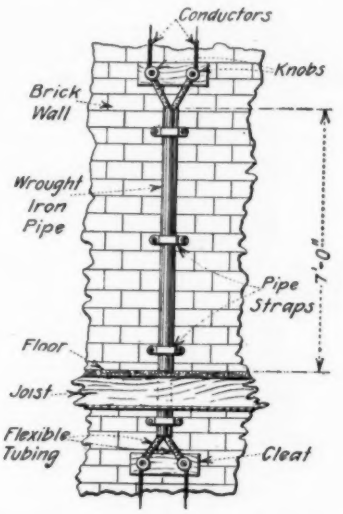


Fig. 7.—Wrought-Iron Pipe Used for Side-Wall Protection.

the bottom of the box to raise the head of the tube from the floor level so that scrubbing water will not drain into it. Short porcelain tubes, not more than 1.5 inches long for seven-eighths-inch boards, should be used in the top of the box. If longer tubes are used they are liable to breakage. In exposed locations the corner of the boxing should be protected with angle irons. The illustration shows the minimum advisable dimensions for protective

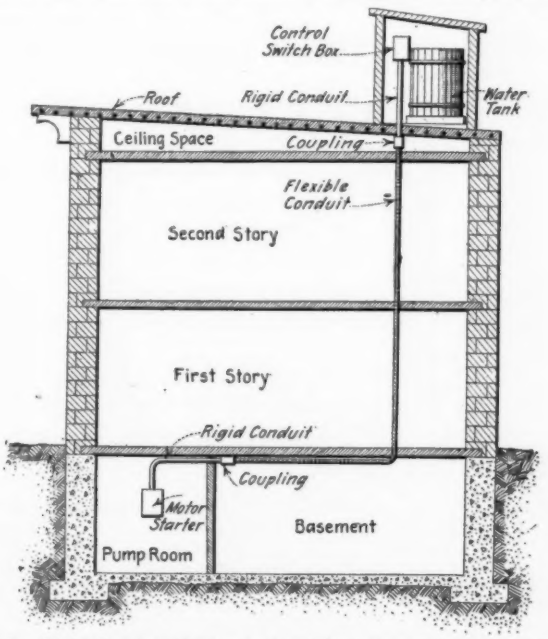


Fig. 8.—Rigid-Conduit Wiring in Locations Exposed to Dampness.

boxing. These dimensions are in accordance with the requirements of National Electrical Code rule 26*h*. Where it is possible to do so, it is advisable to use greater clearances than those illustrated.

Either conduit or common wrought-iron pipe may be used for side-wall protection, as shown in Fig. 6, II, and Fig. 7, respectively. However, there are special requirements to be observed with each of these methods of side wall protection, as will be outlined.

Where wrought-iron conduit is used for side-wall protection and double-braid rubber-insulated conductors are installed within it, no further protection is necessary on the conductors, provided each of the ends of the conduit is equipped with an approved outlet box or fitting. At Fig. 6, II, the upper end of the conduit is equipped with an approved fitting having a porcelain outlet plate which separates and insulates the wires where they pass through it. At the bottom end of the conduit, an outlet box having three of its knockout holes bushed with porcelain is delineated. The two different methods are shown on the one conduit merely for illustration. Either one of the methods can be used at both ends of the same conduit. Where conduit is used for the side-wall protection of double-braid rubber-covered wire the same rules apply as with any conduit installation except that:

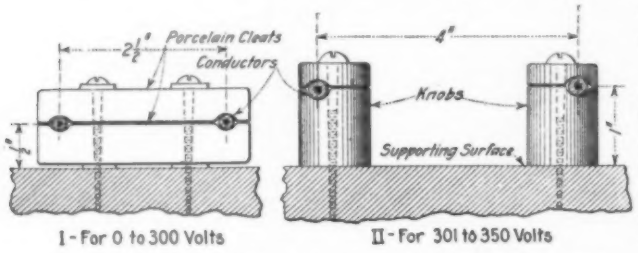


Fig. 9.—Minimum Permissible Clearances for Interior Open Work in Dry Places.

(1) It is not necessary to ground the conduit, and

(2) The wire to be protected may be installed in the conduit before the mechanical work of the building is completed.

Where a length of conduit for wire protection on side walls or ceilings is more than 10 or 12 feet long it is the frequent practice with wiring inspectors to then consider the tubing as a conduit system and to require that it be grounded and meet all the requirements of the Code rules 26*n* and 28.

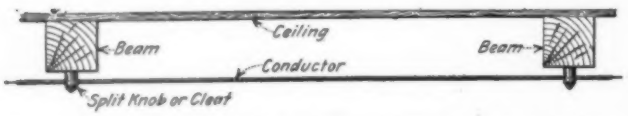


Fig. 10.—Conductor Supported at Each Beam in Mill-Construction Building.

Where ordinary wrought-iron pipe is used for side-wall protection the conductors protected (which may have, according to rule 26*g*, either rubber, slow-burning-weatherproof, or slow-burning insulation) must be, where they pass through the pipe, protected by flexible tubing, as shown in Fig. 7. The tubing must extend from the next insulator above the upper end of the pipe to the next one below the lower end. The tubing should always extend at least four inches out of each end of the pipe.

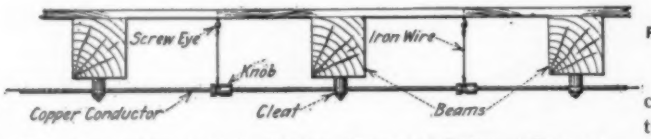


Fig. 11.—Wiring in Mill Building Supported Between Beams.

The advantages of the iron-pipe method of side-wall protection are given in the Factory Mutual's book of rules, substantially as follows: (1) It requires but little space and is therefore much less subject to interference than is the wooden boxing. (2) It is very strong mechanically, providing ample protection to the conductors against mechanical interference. (3) It provides an excellent ready-made floor bushing which is not easily broken. (4) The amount of combustible material involved is considerably less than with the wooden boxing method.

Wiring in Unfinished Attics.

Wiring in unfinished attics or roof spaces is considered as concealed wiring, that is, the conductors must be carried through bushed holes in the timbers just as in the partitions and joists in the lower stories of the buildings. In other words, open-work wiring on knobs or cleats with slow-burning or slow-burning-weatherproof wire is not permitted in unfinished attics or roof spaces.

Wires should not be carried on knobs on the upper edges of joists in attics or roof spaces because such places are frequently used for storage, and are subject to mechanical interference from workmen, hence there is always the liability of the wires being disarranged and things being placed on them. The wires should, if the run is along the length of the joist, be supported on knobs nailed on the sides of the timbers. If the runs are at right angles to the direction of the joists the wires should be carried through holes in the joists bushed with porcelain. The word "unfinished" in rule 26*f*, paragraph 2, could be omitted without changing the intent of the rule, because if an attic is finished (has a floor) it is obviously impossible to run wires on knobs on the tops of the joists.

Fig. 12.—"Dead Ending" of Conductors at a Receptacle.

Wires run near water tanks or pipes are considered as exposed to moisture and should therefore be installed in accordance with the requirements of rule 26*i*, if the wiring is done by the open-work method. Probably the conduit method is the best one for wiring in damp places, in which case rigid conduit should be used. In wiring around a water tank in an unfinished attic, as for example in Fig. 8, the conduit method is the only one permitted. Rigid conduit must be used in the portions of the run exposed to moisture, but the intermediate wiring may be installed in flexible conduit or in accordance with one of the other approved methods. Neither metal nor wooden molding (rule 26*h*) is permitted in damp locations.

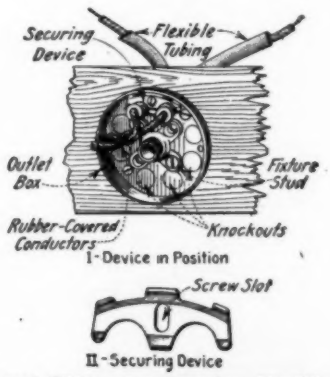


Fig. 13.—Approved Fitting for Securing Flexible Conduit Ends in Metal Box.

Wire for Open Work.

Wire for open-work installation in dry places may have either

(1) approved-rubber insulation,

(2) slow-burning-weatherproof insulation, or

(3) slow-burning insulation.

For these conditions, where the voltage does not ex-

ceed 550, wire with slow-burning insulation is frequently used, particularly in industrial plant installations. Its advantages for such service are (1) it costs less than rubber-insulated wire, (2) it will not carry fire, (3) lint and dust do not collect on the insulating coating of the wire because it has a relatively hard, smooth outer surface.

Rubber and slow-burning-weatherproof insulated wires have rough outer surfaces, which, when warm, become sticky. Hence dust or lint collecting on such wires adheres and is not readily brushed off. Wires having slow-burning insulation should always be used (where the voltage does not exceed 550) where a large number of conductors are grouped together. If wires having rubber or weatherproof insulations are used in such localities, their insulating coverings comprise in the aggregate a large

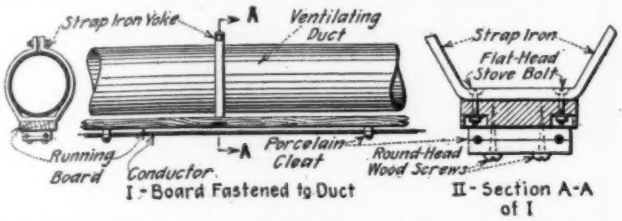


Fig. 14.—Method of Supporting a Running Board From a Ventilating Duct.

amount of combustible material which increases the fire hazard.

Exposed work is not permitted in many municipalities. Many of the large cities in this country have passed ordinances prohibiting exposed wiring in building interiors. For instance, in Louisville, Ky., (ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, December 25, 1915, page 1149) open work wiring is not allowed, the requirements being that all wiring "should be inclosed in metal conduits." This requirement insures that practically all wiring will be installed by responsible concerns and therefore subject to inspection.

Clearances.

The minimum clearances for open-work conductors where the voltage does not exceed 550 are illustrated in Fig. 9. For 500 volts or less the separation between wires must be at least 2.5 inches and the wires must be separated at least 0.5 inch from the surface wired over. The wires may be carried either on two-wire porcelain cleats, as shown in the illustration, on solid knobs if they are bigger than No. 8 and on split knobs if they are smaller, or each wire may be supported by a series of single-wire

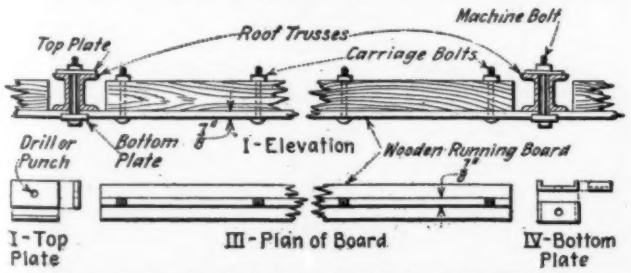


Fig. 15.—Reinforced Running Boards for Long Spans.

porcelain cleats. For voltages of 301 to 550 the wires should be at least 4 inches apart, as shown in Fig. 9, II, and at least 1 inch from the surface wired over. The wires may be carried either on porcelain knobs or cleats.

Open-work conductors should ordinarily be supported at least every 4 feet 6 inches, as experience has shown that, if the sustaining insulators are located farther apart than this, the wires may sag or contact with the supporting surface or with other conductors. Furthermore, if the supports are too far apart the shrinkage of timbers or vibration may materially disarrange the circuits. In locations where the conductors are liable to interference, such as where ceilings are low or in the vicinity of belts or machinery, the insulating supports should not be more than a foot or so apart.

Wires supported at the ceiling in mill buildings may, provided that they are No. 8 or larger, be supported only at each beam as shown in Fig. 10, provided they are separated at least 6 inches. As indicated in the illustration, there is always a clear space between such beams (they are usually located 8 or 10 feet apart) in buildings of mill construction, so that the possibility of the conductors contacting with any material between supports is remote. Frequently, however, it is desirable to arrange intermediate supports as suggested in Fig. 11.

Open-work conductors should not be dead-ended at a rosette, socket or receptacle, unless the rosette is within 12 inches of the last support. Fig. 12 illustrates this requirement, the reason for which is obvious.

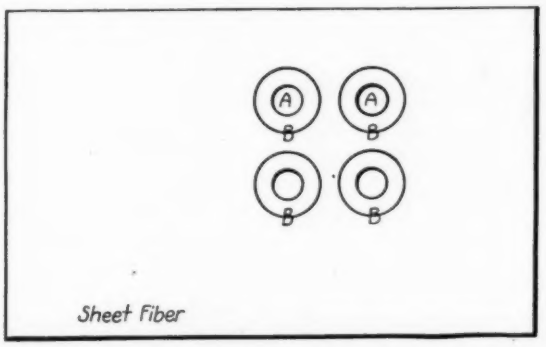
Wiring in Damp Places.

Wiring in damp places is usually subject to special requirements of the local inspection bureau. It has been found extremely difficult to install wiring in these locations which will remain serviceable permanently. New devices and methods for service in damp places are constantly being developed, so that the local inspectors should always be consulted in regard to the latest and safest methods before an installation is undertaken.

Open-work conductors on mill-building ceilings subject to dampness may be installed in accordance with practically the same requirements as apply to the same conductors in dry places and as illustrated in Fig. 10.

Washers for Small Motors.

When overhauling small motors, such as fan motors, it is often desirable to take up a part of the end play in the armature shaft. I have found that the best way to do

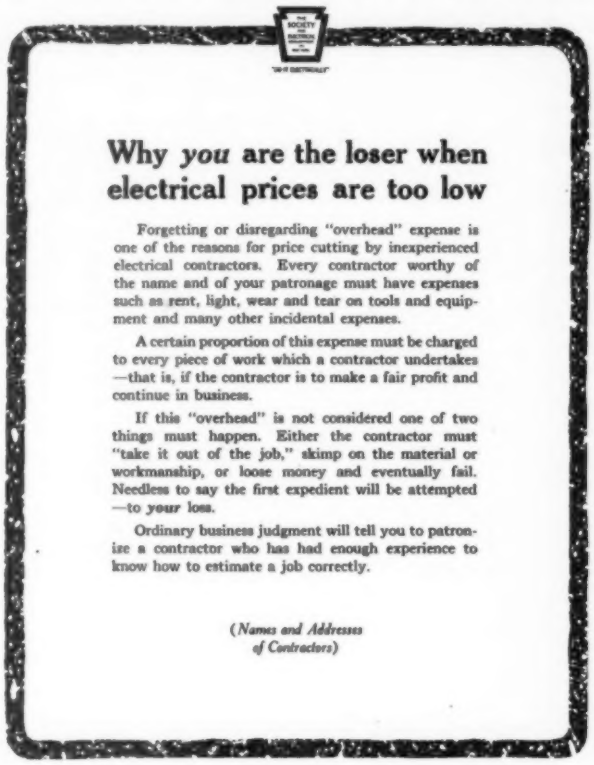


Washers Cut From Fiber for Use in Small Motors.

this is by the use of small fiber washers placed on the shaft between the armature and bearings. The easiest and quickest way to make these washers, if they are not carried in stock, is by means of an auger as shown in the sketch. Carefully measure the diameter of the shaft and select an auger bit the exact size of the shaft or slightly larger. Clamp or tack a piece of thin fiber on a smooth board. Bore as many holes as you desire to make washers in this fiber sheet by carefully turning the bit until its lips have just cut through the fiber. Now change the bit for a size corresponding to the outside diameter that the washers are to have and repeat the operation, inserting the worm of the bit in the same holes made at the first operation. Take care that no more than the lips of the bit cut through the fiber in this case. It is preferable to use bits that are new and very sharp as the cutting lips should extend the thickness of the fiber below the remaining cutting edge.

J. B. Story.

Advertisements to Aid Contractors Develop Good Will



Why *you* are the loser when electrical prices are too low

Forgetting or disregarding "overhead" expense is one of the reasons for price cutting by inexperienced electrical contractors. Every contractor worthy of the name and of your patronage must have expenses such as rent, light, wear and tear on tools and equipment and many other incidental expenses.

A certain proportion of this expense must be charged to every piece of work which a contractor undertakes —that is, if the contractor is to make a fair profit and continue in business.

If this "overhead" is not considered one of two things must happen. Either the contractor must "take it out of the job," skimp on the material or workmanship, or loose money and eventually fail. Needless to say the first expedient will be attempted —to ***your*** loss.

Ordinary business judgment will tell you to patronize a contractor who has had enough experience to know how to estimate a job correctly.

(Names and Addresses of Contractors)

Price-cutting must often mean poor workmanship

A good workman is worthy of his hire. An electrician is generally paid what he earns. Some earn $1.50 a day, some $6.00. Their work shows plainly why there is a difference in their pay.

Then, too, a $6.00 man may do $1.50 work if hurried too much.

If an inexperienced contractor figures his labor cost too low—as is often the case—he has one of two alternatives: He may employ cheap workmen or he may attempt to rush good workmen. In either case the work must suffer. ***You*** are the loser.

Again we say, employ an established and reliable electrical contractor, one who understands from long experience how to estimate costs of labor and material. He will save you money in the end.

(Names and Addresses of Contractors)

Make it easier to rent that house

"Is it wired for Electricity?" This is one of the first questions asked by the vast majority of prospective tenants. How will you answer it? If you can say "yes" the house will already be half rented, for, of all modern improvements Electricity is recognized as the first and greatest.

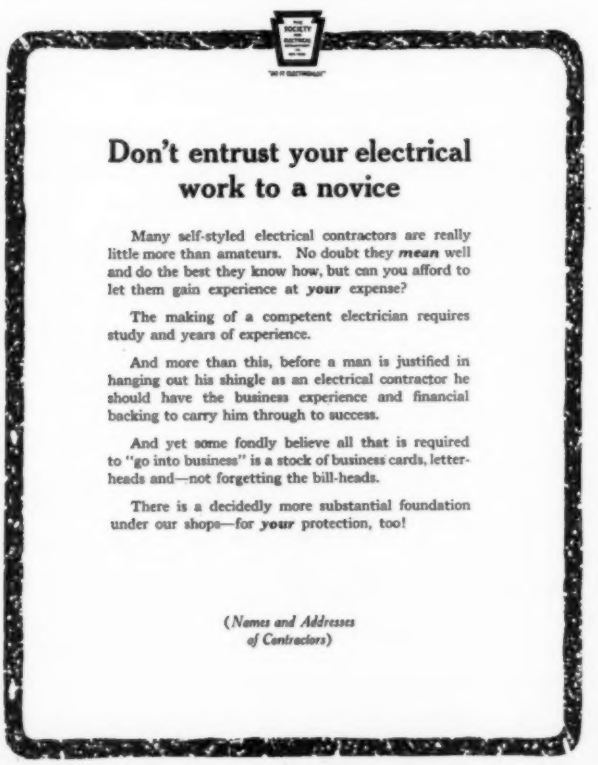
Arrange to have your property all put on the "Wired for Electricity" list. The increased rental will quickly pay for this small investment.

Many real estate men so appreciate the value of Electric Service that they do not attempt to rent or sell a house without first wiring it for Electricity.

See that ***your*** property has Electric Service before the renting season is upon you.

One of the following thoroughly reliable and competent contractors will be glad to estimate on wiring one or more of your houses the ***right*** way.

(Names and Addresses of Contractors)



Don't entrust your electrical work to a novice

Many self-styled electrical contractors are really little more than amateurs. No doubt they ***mean*** well and do the best they know how, but can you afford to let them gain experience at ***your*** expense?

The making of a competent electrician requires study and years of experience.

And more than this, before a man is justified in hanging out his shingle as an electrical contractor he should have the business experience and financial backing to carry him through to success.

And yet some fondly believe all that is required to "go into business" is a stock of business cards, letterheads and—not forgetting the bill-heads.

There is a decidedly more substantial foundation under our shops—for ***your*** protection, too!

(Names and Addresses of Contractors)

A new development in constructive work by an association is being brought out by the Society for Electrical Development. A series of 20 newspaper advertisements has been prepared and mailed to jobber and contractor members for use in their local newspapers in assisting them in building good will by pointing out the benefits of dealing with recognized contractors. The advertisements, with complete directions for the printer have been mailed so that the members will not be troubled with the detail of writing and laying out copy. Each advertisement emphasizes the fact that price alone should not govern the letting of contracts for electrical work.

This work on the part of an association opens a field untouched so far. It will be noticed that instead of recommending that this kind of advertising be done, the advertisements are actually prepared and placed in the hands of the men to be benefited. The advertisements were arranged by an expert and will prove of material assistance to contractors using them. Contractors are constantly using newspaper space, but the advantage of using space for building good will is an opportunity frequently overlooked.

PULLING-IN LEAD-COVERED UNDERGROUND CABLES.

By H. S. Percival.

The demand for subsurface construction in cities and improved suburban localities has involved many difficulties, particularly in connection with the installation of underground electric communication and power systems in which the maintenance of a high degree of insulation is a vital factor. When such systems were first installed the methods were crude, costly and none too reliable, but gradually satisfactory schemes were worked out, special tools and appliances developed and at length a whole new industry has been created.

In the early days various materials were employed to

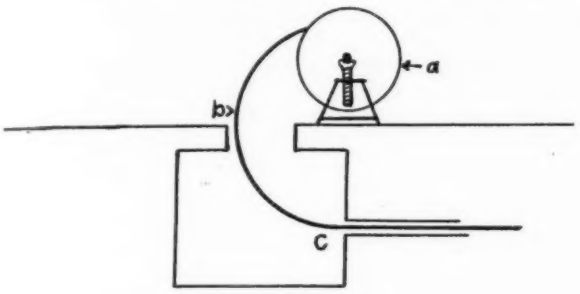


Fig. 1.—Position of Cable Reel.

insulate and protect the conductors but now lead-covered cables are almost universally used, and with the demands for a large number of conductors in telephone and telegraph working and the necessity of transmitting heavy currents in modern power systems, these cables are frequently quite large. The "pulling-in" of a large lead cable not only requires considerable power, but extreme care is essential to prevent injury to the sheath, which would permit the subsequent entrance of moisture and cause the failure of telephone cable, and in power work even more disastrous consequences.

The practice of pulling-in cables by hand windlasses has been generally abandoned as too slow in jobs of any magnitude and reliance is now usually placed on small portable winches driven by some form of gasoline engine. Several manufacturers of motor vehicles now offer trucks of from one and one-half to five tons capacity equipped with a winch which may be operated from the truck engine. Winches mounted on horse-drawn trucks and geared to gasoline engines also mounted on the truck are quite satisfactory. The engine may be either of the stationary type with hit-or-miss governor, or of the marine type with throttle control. The latter type is ordinarily smaller, but in either case the outfit usually takes up most of the space on the truck and the transportation of tools or material is correspondingly limited, whereas in the case of the automobile truck only a small portion of the floor space is occupied by the winch.

Engines of from 5 to 15 horsepower are usually employed, except in the case of automobile trucks, where the engine power is governed by the requirements of the truck rather than by those of the winch. Whatever the source of power, the gear ratio should be such as to give a peripheral drum speed of from 50 to 90 feet a minute. Slower speeds require too much time for pulling-in, and higher speeds do not permit of proper inspection of the cable as it comes off the reel. Furthermore, with high speeds, if the cable binds or jambs at the duct entrance, serious damage is liable to be done before the pulling-in can be stopped. All winches should be equipped with a friction clutch so that the drum can be stopped or started independently of the engine.

Previous to the pulling-in it is necessary to rod the duct to be used in order to establish a line by which to draw in the pulling-in rope. This is ordinarily done considerably in advance of the pulling-in so as not to delay that work. Various types of jointed rods are on the market. Some terminate in threaded brass nipples, a male thread on one end and a female thread on the other, but more commonly some form of patented interlocking joint is provided which permits of more rapid connection and disconnection than with the screw type. The rods are pushed into the duct from one manhole and when they appear at the adjacent hole a wire is fastened to one end and pulled in.

Where more than one length of conduit is to be rodded and where the ducts on one side of the manhole register with those on the other, the rods are not unjointed at each manhole but are pushed through from one length of duct to the next until the end of the run is reached or until a corner makes it necessary to unjoint the rods.

Some types of rods are equipped at each end with rollers, which facilitate the rodding if the ducts are clean. If the ducts are choked with mud and sand it is necessary to clean them or to employ a type of rod in which the joint is little or no larger than the rest of the rod. Screw rods are particularly satisfactory in this respect and where choked ducts are encountered it is frequently quicker to employ them and clean the ducts later with a mandrel on the pulling-in rope than to clean the ducts in advance of the rodding.

Many types of cleaning tools are commercially available, usually consisting of some form of cylinder placed on the first rod. The cleaner is pushed into the duct until filled with the debris. It is then withdrawn and emptied and the operation repeated until the duct is clear. This is obviously a slow and laborious process.

No. 10 or No. 12 annealed iron wire is ordinarily used in connection with the rodding. If the ducts are dry or if the cable is to be pulled in within a few weeks after the rodding, it is unnecessary to employ galvanized wire, but if the ducts are wet and the cable work is not to follow within two or three weeks, the wire is liable to be so weakened by rust as to break when drawing in the pulling-in rope. At the manholes care should be taken, especially if the ducts are wet, to keep the wire in one direction

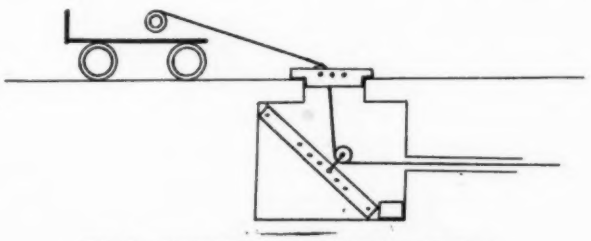


Fig. 2.—Arrangement Requiring Two Pulleys.

from contact with that from the other, as in that way the wire is less liable to attack by electrolysis.

When the pulling-in is to be started, the cable reel should be set up in line with the duct run and on the side of the manhole toward the pull, as shown in Fig. 1. This type of set-up is particularly important in the case of large cable, as any other arrangement results in reverse curves in the cable and considerably complicates the feeding. Care should be taken to have the axle bar level as otherwise the reel will slip toward the lower side as it turns and bind against the support. If the cable is large, two men should be stationed at *a* to handle the reel as the cable is pulled in. One man should sit on the edge of the manhole at *b* to keep the cable from scraping. This man should be in charge of the operations at that point. He should be in a position to signal the man handling the switch and should

direct the men at the reel as to the proper speed to pay off the cable. A man should also be stationed at *c* to guide the cable into the duct.

Before the pulling-in can be started, it is necessary to draw the pulling-in rope into the duct, using the wire installed by the rodding gang. This can be done conveniently while the reel is being set up. The pulling-in outfit should be stationed at the proper manhole, in position for the pull, and the pulling-in rope, previously coiled on the drum, should be attached to the end of the wire in

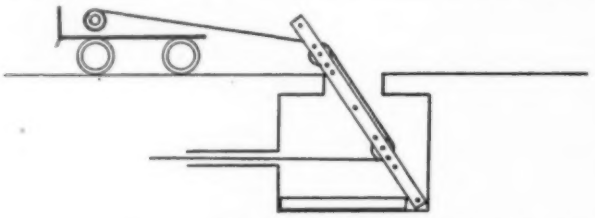


Fig. 3.—Arrangement Permitting Pulling Cable Farther Into Hole on Initial Pull.

the duct. The pulling-in rope may then be drawn in by one or two men if the ducts are clean. The wire should not be coiled in the distant manhole but should be pulled out over the ground as this is much quicker and allows the wire to be coiled later without delaying other operations. If the ducts are to be rodded when the pulling-in is done, the wire is, of course, unnecessary as the pulling-in rope can be attached directly to the rods and drawn in. The rodding, however, ordinarily consumes so much time that the saving in wire is more than offset by the delay to the pulling-in gang. It is usually economical to rod in advance, even for one length of cable.

If the ducts are thoroughly clean and of fiber or wood, the cable may be attached directly to the pulling-in rope, but it is generally better, even under these conditions, to place a mandrel between the rope and the cable. In the case of tile ducts or ducts of any material which are not thoroughly clean, a mandrel is essential to clear the duct and prevent injury to the cable from pieces of duct or foreign matter. When the ducts are badly choked with sand or mud, the mandrel should be pulled through without the cable as many times as required to properly clear the duct. The rodding wire should be attached behind the mandrel in order to again draw in the pulling-in rope.

Various set-ups are used for pulling-in work. The arrangement shown in Fig. 2 is frequently employed but requires two pulley frames, though the frame at the manhole rim may be omitted if the pulling-in truck is equipped with a roller on the end and the conditions permit positioning the truck so as to bring the roller over the hole. The arrangement shown in Fig. 3 is also common, but this and the Fig. 2 set-up require that the lower end of the pulley frame be blocked in position. This requirement is obviated by the set-up shown in Fig. 4, which also gives a more generous angle on the pulling-in rope at the lower pulley. The Fig. 3 arrangement, however, permits drawing the cable further into the hole on the initial pull and if the length in the manhole is sufficient for splicing purposes, thereby eliminating the need of a second pull, that set-up is to be preferred to either of the other two.

Ordinarily no set-up brings sufficient cable into the manhole on the initial pull to permit of properly racking the cable around the hole with the splice at the center of the side wall. This does not refer, however, to cases where some form of hook or loop, known as a pulling-in iron, is set in the end of the manhole just below the duct entrance. By attaching a snatch block to the pulling-in iron, the cable can, of course, be drawn practically across the manhole, but such an arrangement is not satisfactory for large cables as the end wall will not ordinarily stand the strain imposed. It is therefore necessary with cables of considerable size to make a second pull. This can be done by moving the cable grip back a few feet and taking a short pull. This method is quite satisfactory where an "open-end" woven-wire grip is used, but where a grip is employed which involves beating down the cable sheath, it is necessary to adopt other means, such as making a temporary hitch with a rope winding. Where several lengths are to be pulled in, a convenient method consists in making the second pull through the duct in the adjacent section before that section of cable is pulled in. The pulling-in rope and the grip will, of course, be in position for the purpose and it is a short matter to pull the cable across the manhole, remove the grip and place it on the second cable ready to pull in that section.

Pulley frames are made in various forms and a common arrangement is shown in Fig. 5. This frame consists of two 6 or 8-inch channel irons bolted together at two or three points with spacing collars of sufficient size to permit the free operation of the pulley. The pulley bearing consists simply of a bolt of the proper diameter with nut to fit, and several holes should be provided in the frame to permit placing the pulley at the proper point in each set-up.

Woven-wire grips, of which there are several kinds on the market, are satisfactory for ordinary work. Such grips, however, hold only on the sheath and where the situation involves long duct sections and heavy cable and particularly where the ducts are not clean, it is well to use a grip which takes hold on the cable core as well as the sheath, otherwise the sheath may be pulled off the end. Such a grip can be made by beating two or three circular grooves into the sheath, the first 6 inches from the end and the second 10 inches from the first, etc., and braiding on No. 10 or No. 12 iron wire, forcing the wire into the grooves by circular wrappings. The wire should be braided, i. e., laid on in criss-cross fashion and each strand should be carried through a ring or eye 6 inches from the end of the cable, into which the pulling-in rope may be fastened.

Mandrels are usually of hard wood with metal caps at the end. They should be provided with a bolt passing completely through the mandrel and with an eye at each end. The eye should be welded, as the strain may be easily greater than a bent eye could withstand. The shape and size of the mandrel will be governed by the duct, but, in general, the outside diameter of the mandrel should be about one-fourth less than the inside diameter of the duct.

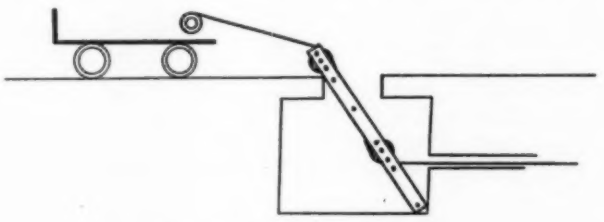


Fig. 4.—Approved Arrangement.

Fig. 5.—Pulley Frame.

Ordinary three-fourths or one-inch manila rope may be used for pulling-in small cables, but for heavy work three-eighths or one-half-inch steel hoisting rope should be employed.

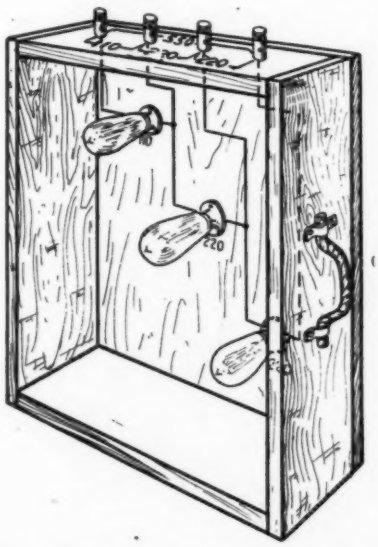
When the cable has been pulled in, it should be tied up to keep the end off the ground, unless it is to be spliced within a day or two. The various lengths should also be connected together electrically and to any other cables which may be present in order to reduce the possibility of electrolytic corrosion.

DOLLAR WIRING KINKS

Every reader is invited to contribute to this page. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Handy Test Box for Trouble Work.

The accompanying diagram shows a test box that I have found very handy in locating trouble on all kinds of motor work, also in lighting circuits. This box can be easily and cheaply made by any electrician. All that is required is a box about 6 by 10 by 4 inches. In this fasten three cleat-lamp receptacles on the bottom and connect these to a set of four binding posts at one end as shown. In the receptacles are placed a 110-volt lamp and two 220-volt lamps. It is well to stamp the figures 110 and 220 alongside the corresponding receptacles and also on the end of the box to stamp the figures for the various voltages, which can be tested between the different terminals. Line the box with asbestos and put on a hinged cover with three one-inch holes directly over the three lamps. Fasten a small piece of brass wire gauze on the inside over each



Handy Testing Box for Different Voltages, Shown with Cover Removed.

hole so that no trouble will develop from dropping anything into the box and breaking the lamps. A handle may be put on one side, if desired. From the diagram it is evident that the binding posts are arranged to give 110 volts between the first pair and 220 volts between each of the other pairs. When testing a 440-volt circuit the wires are connected to posts 2 and 4 and when testing a 550-volt circuit the wires are connected between 1 and 4.

Walter Morris.

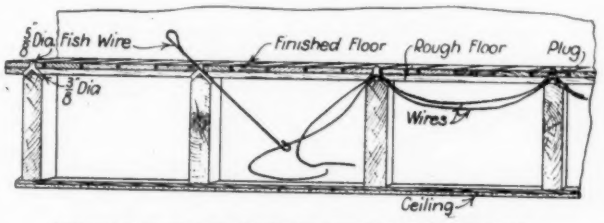
Separating Frosting and Lamp-Coloring Compounds.

In coloring some red, frosted and blue lamps for a flag some red coloring got into the can of frosting compound. The first thought I had was that the frosting was spoiled, but I got out of the difficulty as follows: I poured the frosting through a number of layers of absorbent cotton which were in a funnel placed in a bottle. I tried this four times and finally cleared the red from the frosting and was able to use this frosting on the rest of the lamps minus the tint of red. The possibility of doing this may be of interest to others.

M. J. Moriarty.

Running Bell Wires Under Double Floors.

When the owner of a house did not want the floor disturbed, especially when the floor was a double one, I have used the method indicated in the sketch for running bell wires. I find that it saves the time of removing boards from both the finished and rough floor and of replacing them. On single floors the time consumed in taking up and replacing boards as compared with the method shown is about the same, but the method indicated leaves the floor in better condition. When wires are run parallel



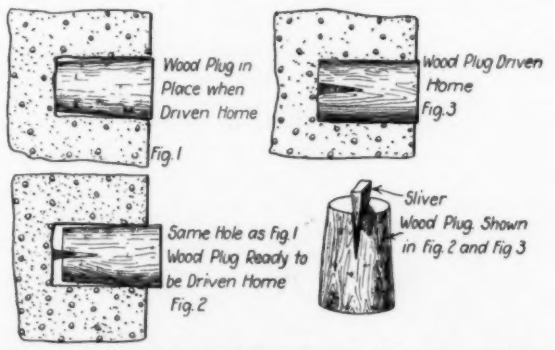
Method of Running Bell Wires Concealed Under Floor.

with the floor joists, this is easily done by cutting a pocket in the floor after removing the baseboard, but on running at right angles to the joists, especially where the flooring comes close up to the wall, the floor boards have to be removed or some similar method used, if the wires are concealed. The diagram makes the scheme I used quite clear. It consists first in locating the joints and then boring a hole through the top flooring straight down with a large bit, say five-eighths inch, as an electrician usually carries this size bit in his tool outfit. Then bore two smaller holes, say with a three-eighths-inch bit, so as to straddle the joists as shown. Fish in the bell wires and plug up the top or larger hole.

Robert Oster.

To Make Wood Plugs Tight.

In fastening conduits and outlet boxes where the proper expansion bolts or lead anchors are not at hand, it often becomes necessary to resort to the old-fashioned method of employing a wood plug. As commonly used, a wood plug is not a reliable fastening, as can be readily seen from Fig. 1. When properly installed, however, a wood plug can be made very effective. A simple means of making it a secure fastening is shown in the accompanying sketches. It consists merely of putting a notch in the


Wood Plug in Place when Driven Home
Fig. 1
Wood Plug Driven Home
Fig. 3
Same Hole as Fig. 1
Wood Plug Ready to be Driven Home
Fig. 2
Sliver
Wood Plug. Shown in Fig. 2 and Fig. 3

Simple Method of Wedging Wood Plugs to Make Them Tight.

inner end of the plug and slipping into this a small wedge or sliver. It will be noticed that by every blow of the hammer given to the plug it will be expanded, causing it to be thoroughly wedged in the hole and completely filling it when fully driven home.

John Domerhuizen.

THE DEALER AND STOREKEEPER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-Keeping for the Dealer in Electrical Goods

METHODS OF ENERGIZING THE MONTHLY STATEMENT.

A Form of Auditing Sheet and Other Hints How to Make Statements Effective.

By W. B. Parker.

Almost all lines of business, both wholesale and retail, use the monthly statement as a means of securing regular payment of their outstanding accounts. But there is a great deal of difference in the results obtained by various business houses. The purpose of this article is to point out this difference and make such suggestions as would be of assistance to one who has not given the subject special attention. It is an old saying that "anything that is worth doing at all is worth doing well." If monthly statements assist at all in bringing in the money—and they certainly do—then the best way of using them will bring in the most money, or in other words, add to the percentage of efficiency, and therefore the profits.

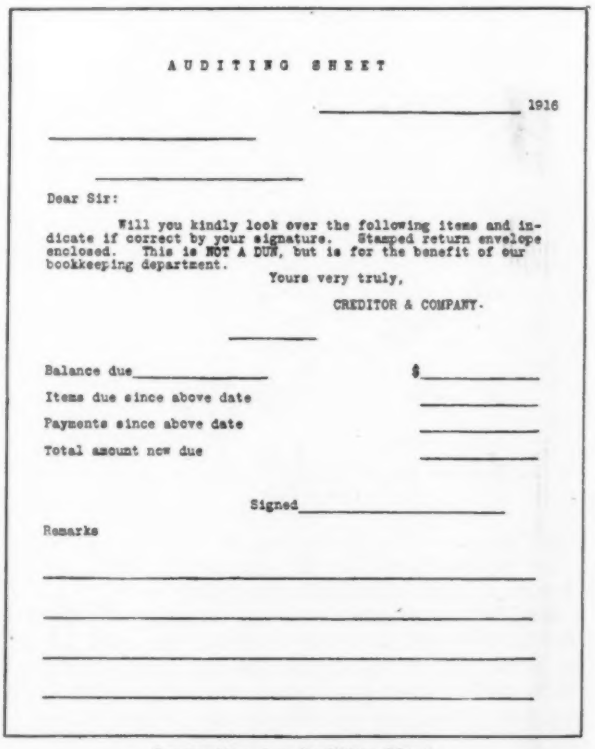
The first important point to consider is the form of statement to use. Very often this matter is left entirely to the printer, as though it were a matter of no importance at all. He is merely asked to quote on so many thousand statement forms and given a letter head from which to pick out the lines or words to make up the copy. As nothing is said about the quality of paper, he may use the cheapest he thinks the firm will stand for, and as it is usually a question of price instead of quality he does not feel it incumbent on him to give any advice in this regard. The result is that the majority of monthly statements in general use are not nearly as effective as they might be if effectively printed and ruled and a paper used that would cause the recipient to give it more than passing attention.

This being true, there is a great opportunity for one who appreciates the difference in result between the use of the best and the cheapest stationery to make much of the possibilities that lie mostly dormant in the printing of the monthly statement. If every one used the most effective form its general use would cause it to lose some of the efficacy it now has, as it is in part the special attention that a "different" statement attracts that makes it so especially efficient.

One form of statement that the writer knows to have been very satisfactory in use did not cost much more than the ordinary kind. It was printed on a pink bond paper and cut note-sheet size instead of the regular statement size. This made it stand out on the desk when the mail was opened by the debtor and was not so easily mislaid or improperly filed. There were two columns for items, one headed "Items Now Due," and the other "Items Past Due." At the bottom of the statement the following words appeared: "This statement is NOT A DUN for items not due; for those due or past due we would appreciate your prompt remittance." You will note that there was no column for items not due, but the form of wording used would cause the recipient of the statement to go over it to see if there was. The whole purpose of this statement was to get the debtor to pay attention to it on its receipt, instead of laying it at one side. And this was exactly the result obtained.

Where a discount is allowed for payment within a certain specified time this should be indicated on the statement in a manner that will show up strong. If printed, red should be used for the line stating the discount, but a rubber stamp with purple ink is even more effective. Where no discount is allowed after the statement is sent, but would have been allowed if paid sooner, then the discount should be emphasized on the bill sent. There are two views on this matter of allowing discount, one that it is given because others do, but that the creditor would prefer the debtor did not take advantage of it; the other, that the customer who discounts is the most valuable customer in the end, even if the creditor does apparently lose money by his taking a discount. This latter view the writer entirely agrees with, and therefore believes that where a discount is allowed at all it can not be too strongly brought to the attention of the debtor.

What is known as an "Auditing Sheet" can be used to advantage in connection with the monthly statement in many instances, especially where there are a number of slow accounts who are perfectly good, and for that reason it is not desired to ask for the money although it is past due. The purpose of this sheet is apparently to have the debtor check up the items of his account and advise if correct, for the benefit of the bookkeeping department. This was the sole purpose when it was first originated by the Standard Oil Company, but with the addition of a few blank lines below the line for signature, it has been found to be an effective aid to collections. It loses its effect if used too often and for that reason should not be used oftener than four times a year. It may be made out at the same time as the statement, and fastened to it with a paper clip.



AUDITING SHEET

_____ 1916

_____

_____

Dear Sir:

Will you kindly look over the following items and indicate if correct by your signature. Stamped return envelope enclosed. This is NOT A DUN, but is for the benefit of our bookkeeping department.

Yours very truly,

CREDITOR & COMPANY.

_____

Balance due_____ $_____

Items due since above date _____

Payments since above date _____

Total amount now due _____

Signed_____

Remarks

_____

_____

_____

_____

Suggestion for Auditing Sheet.

Favorable Attraction a Merchandising Asset

Means and Methods for Securing Favorable Attraction for the Electrical Dealer in Order to Realize More Intensive Merchandising

By M. V. Rutherford
Sales Manager, Sterling Electric Company, Minneapolis, Minn.

SELDOM does the merchandiser of electrical appliances stop to consider what the power of favorable attraction means to his business. Yet a small amount of study will reveal the fact that it is the foundation on which all successful business is built. Needless to say, the dealer must sell his stock. But in order to do so he must make a continued favorable impression upon the public in order to draw customers into his store.

Since favorable attraction is so essential to successful merchandising, it would be well to analyze it and find out just what constitutes favorable attraction. Is it the presentation of original, interesting and appropriate window displays, or newspaper and circular advertising of the most modern kinds? Is it offering to the customer the very best service it is possible to give, or is it offering a better selection of stock than any competitor provides? Or is the customer attracted by special or seasonable sales? Truly, these are all attractions, any one or all of which make an appeal to the individual purchaser. But many other ways exist in which the dealer can establish and maintain a favorable impression upon the people in his locality.

TO GAIN PUBLIC FAVOR

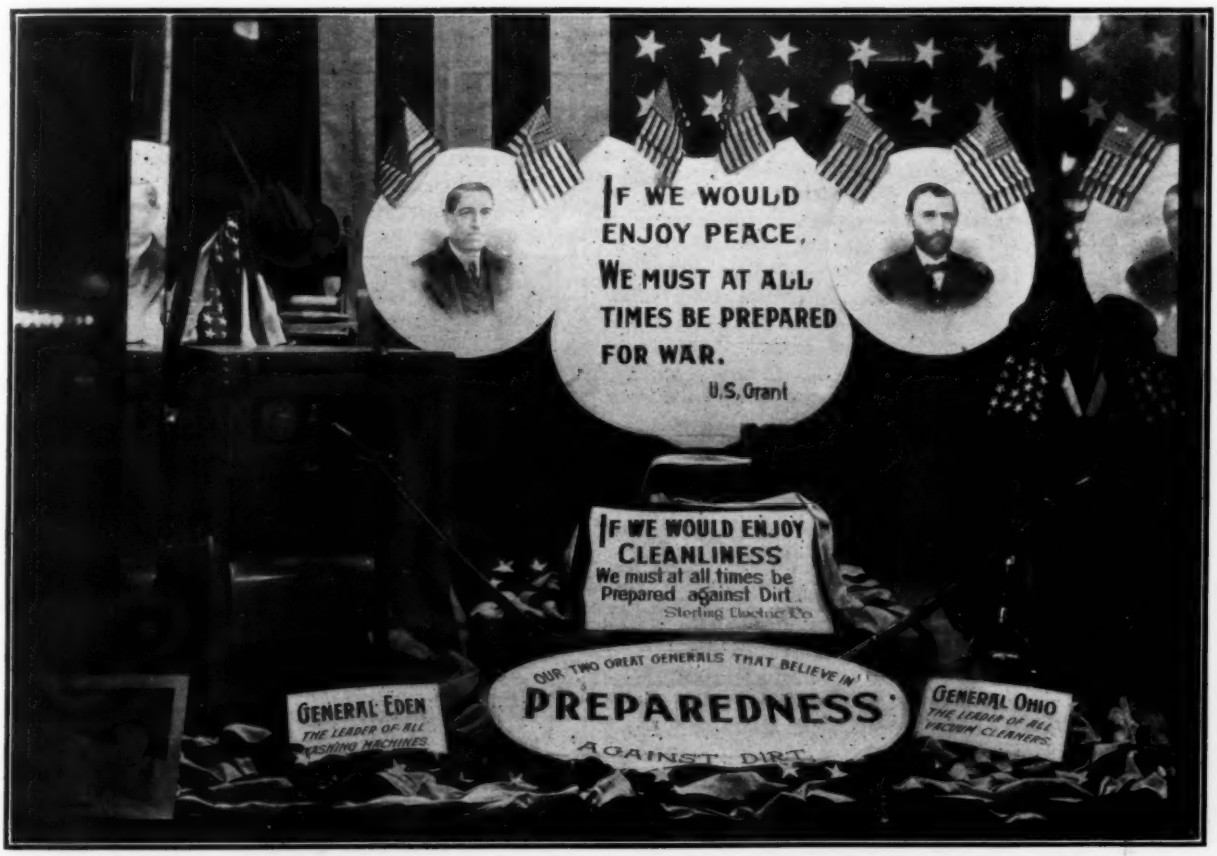
Window displays should be original, carefully dressed, appropriate, co-operative with advertising matter, and should be changed often.

Advertisements should be well planned, prepared and placed.

Service should include quality and variety of stock, and courteous treatment of patrons—the "willing-to-serve" attitude.

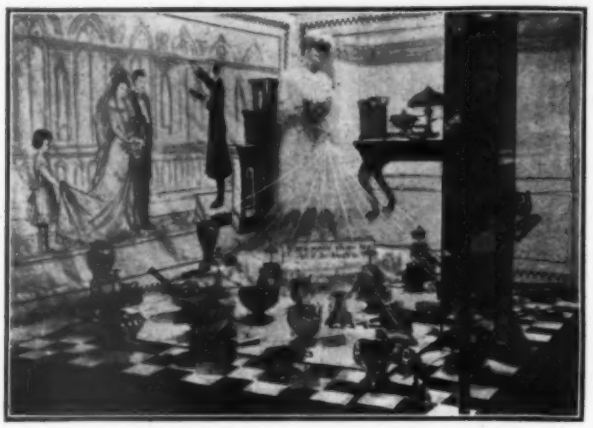
The drawing power exerted by the dealer on the public may be the result of what are called present or creative demands. For example, if a person is in need of some article he knows a certain dealer does or should carry in stock, that dealer is able to satisfy a present demand. Whereas, if the dealer creates in the mind of a person the need of a certain article, and then makes the sale, he is establishing and satisfying a creative demand.

To a person with a present demand a dealer's drawing power consists of his quality of service and the quality and variety of his stock, and his reputation for all three. Advertising, circularizing and window displays play an important part in the present demands of the public, though it is usually of an indirect nature. The use of a certain electrical appliance is suggested to the person by a window display or an advertisement. His need for the article is not pressing, but when it is made sufficient he remembers where he can make


IF WE WOULD ENJOY PEACE, WE MUST AT ALL TIMES BE PREPARED FOR WAR.
U.S. Grant
IF WE WOULD ENJOY CLEANLINESS
We must at all times be Prepared against Dirt
Sterling Electric Co
OUR TWO GREAT GENERALS THAT BELIEVE IN
PREPAREDNESS
AGAINST DIRT
GENERAL EDEN
THE LEADER OF ALL WASHING MACHINES
GENERAL OHIO
THE LEADER OF ALL VACUUM CLEANERS

Striking a Popular Note and Associating It with the Goods for Sale Always Produces Favorable Attraction.

A timely window display that was installed by the Sterling Electric Company just after President Wilson announced his views on preparedness. The idea conveyed to the public was that electric washing machines and vacuum cleaners were great fighters against dirt. The display met with popular approval and served to make a large number of sales.



An Attractive Setting for the Conventional Bridal Display.

The Sterling Electric Company's 1915 June bridal window. A seasonable display, with an appropriate background, that suggests many pleasing electrical gifts.

the purchase and is accordingly guided there. Usually, though, the dealer satisfies present demands by his established reputation for service and for the quality and completeness of his stock.

There are many very successful dealers and jobbers throughout the country, in various lines of business, who depend almost wholly on these three factors for the conduct of their business. Once they have established a reputation, trade comes to their doors, and it is only necessary for them to strictly maintain that reputation in order to do a satisfactory and profitable business. Most firms, however, are not content with such a business and are continually reaching for more, as they should in this ambitious age.

Of creative demands much of worth can be said, especially in regard to the electrical industry. There is yet no limit to the amount of electrical merchandise that can be placed in the hands of the consumer, which leaves a very wide field for the fostering of creative demands. The electrical dealer is not hampered by the lack of opportunity to succeed. His own ability is his only limitation.

Compare, for example, the electrical industry with the shoe industry. They are as dissimilar, in most respects, as their products. The output of the manufacturers of shoes is limited because just so many and no more will be worn during a certain period. An indication of their efforts to increase the output is given by the extreme styles and changes in styles, which brings about, in as great a measure as possible, the result they are seeking. In the electrical industry, conditions are wholly different. People who have never handled electrical devices are being initiated to their uses day by day. The field is by no means covered, and there are undoubtedly fields that have never been touched. There is no reason for thought as to changes in the styles of electrical appliances, simply for the purpose of marketing more of them. The field is fertile, and there seems to be no need for anything but more intensive cultivation.

Creative demand is the basis of the many national and city campaigns that have been instituted to place more electrical appliances and make the use of electricity more general. It means the creation of new business, surely the most pleasing kind to the dealer, who, after establishing a list of satisfied customers, welcomes any movement for the acquisition of new customers.

When a manufacturer places a new product on the market all that is possible is done to favorably attract the jobber and dealer. In this case his medium is confined to the efforts of his salesmen, to advertising and publicity in the trade press, to circularizing and to offering helps to dealers. In order to attract the consumer some manufacturers popularize their products by extensive advertising in national periodicals, in this way creating a direct and greater demand. If the manufacturer can secure the favorable interest of a large number of consumers then the results are satisfactory.

Advertisements must be carefully prepared and placed to accomplish their purpose in an acceptable manner. Glance through the advertising section of any of the widely circulated periodicals. Some advertisements will attract, while others will go unnoticed. Many that attract for the moment are not altogether favorable, and are really a detriment to the product the advertisement is placing before the readers. Something is the matter with these advertisements, the wrong impression is given, and while attraction is gained it is not favorable.

Many electrical dealers do not realize the value of window displays for advertising their business, their wares, and for securing the favorable attention of the passersby. They are like the little boy, who, when asked if he could play the piano, answered: "I do not know; I never tried." Making the most of window space is only a question of trying, of becoming interested in displays and then growing enthusiastic about them. It is very well to advertise in the newspapers, magazines, and other mediums, but the drawing power of those advertisements may be greatly increased by having the co-operation of a well-dressed, attractive window display that corresponds with the advertising matter. The proof of this fact is in the methods of the large manufacturers, who conduct a national advertising campaign on their special lines during a certain week and request all dealers to dress their windows accordingly. The manufacturer gives himself all the assurance possible that the dealers will do so by furnishing the window trims. If it pays these large national advertisers, certainly it will pay the local dealer to co-operate his window displays with his advertisements.

Window displays should be seasonable and should be changed often. While it is not always possible, still an effort should be made to have them original. They will then carry a distinct individuality that becomes a very valuable asset. If there is any copying to be done it should be left to the competitive dealer, and if he does copy some free advertising will be received by the dealer with the

An Original "Bridal" Window Display.

The Sterling Electric Company's 1916 June bridal window. The proclamation at the foot of the throne reads that the June bride should be started on the Universal road to happiness by purchasing Universal electrical appliances for her. The flooring of this window was covered with royal purple felt. The throne, as well as the background, was covered with royal purple plush, and leading out from the throne was a heavy red plush carpet, on which rested the proclamation. The queen's robes were copies of Queen Elizabeth's coronation robes and originally cost a considerable sum of money, being rented from a large costume company. The rich color scheme, which, of course, does not show in the illustration, set the display of nickel and silverware off to great advantage.

original display, for the public will long remember a good display and associate it with the name of the dealer who originated the idea, even though it is in the other man's window.

The first glance a pedestrian takes at a window display must arouse enough interest to cause him to further investigate. When this result is attained fully one-half of the purpose of the display is accomplished. Then, with 50 per cent of the battle won, the interested people should not be disappointed. Their investigation of the display should yield something of a satisfactory nature. The dealer should convey to them in as simple and brief a manner possible that they should purchase his wares; a statement should be made as to the quality of the article shown, and lastly, though a very important point, prices should be indicated.

It is not necessary for a window display to accomplish direct results; that is, it cannot be expected to attract attention, give its message, draw the interested person to the counter and then make a satisfied customer. This is often done, and is very gratifying, but the province of the window display is not as great or broad as that. Rather, it should be considered wholly satisfactory if it secures the attention of a fair proportion of the pedestrians and leaves in their minds an idea or ideas associated with the display itself, the articles shown, their utility and prices, and the name of the dealer. Each onlooker gains an impression of how the dealer conducts his business, and, since first impressions are often considered correct, even though vague and intangible, it is very important that they should be favorable.

A large number of good displays do not tend toward creating sales because the goods are not priced. Those observing the display will not step inside the store to ask the price of an article unless they are exceptionally interested. If the price is shown in plain figures many times it will result in conveying the idea that electrical appliances are not expensive luxuries, but are within the reach of all.

When arranging a window display it is a good plan to try to place yourself in the position of the prospective customer, remembering that he is not enthusiastic over electrical appliances and does not know their value. The same is true in regard to the preparation of advertising copy. It is rather difficult for the dealer to get the outsider's viewpoint, but it is good practice to try, and it

Timely, Instructive and Interesting, This Window Display Was Favorably Attractive, Indeed.

An original and seasonable window display exhibited by the Sterling Electric Company during the week preceding Edison Day of last year. This window interested the public because it was instructive, giving the evolution of the incandescent lamp and information as to when each lamp was introduced and its efficiency. In the foreground was placed one of each style of Edison lamps that the customer might have occasion to purchase. In front of each lamp was a card giving the wattage, candlepower and price.

An Out-of-the-Ordinary Fan Display.

When this display was installed, on the warmest day of the season, it really was fan time. The thermometers explained the reasons for a fan. A few days later the weather turned cold. Electric radiators were added to the display and the fans were placed to send the warm air toward the thermometer registering the higher temperature. That the public was interested in the manner of adapting the display to weather conditions was evidenced by the many comments made to the salesmen about it.

serves to solve many dealer's problems in his contact with the public. It should be borne in mind that the window display and the advertisement are the silent salesmen whose duty it is to favorably attract and to create a desire for the purchase of the goods displayed or advertised.

Service, taken in its broadest sense, is the basis of business. Supply and demand are the factors of business, and to supply a demand is rendering a service. The public demand on a dealer may be such that he is required to carry a large stock of quality goods. Accordingly he should stand ready to meet that demand if his business justifies him in doing so; that, at least, should be the minimum extent of his ability to serve. On the strength of that ability alone his business will receive favorable attraction. He simply stands ready to give the public what it wants in his line. Essentially that is service.

However, service, in its higher sense, consists of more than being able to supply a desired article. If the dealer adopts the plan of striving to satisfy every reasonable demand of every customer, of assuming an evident "willing-to-serve" attitude, his service cannot help but tend toward the best, and his reputation for extending good service becomes known and attracts favorable attention. Possessing a sense of justice and maintaining cordial relations with all customers is sometimes difficult. It is necessary to stretch a sense of fairness, to be a give-and-take man, in order to make and keep customers satisfied.

The result of good service is well worth seeking. The satisfied customer is the best advertiser there is, even though his work is unheard and unseen by the dealer. Taking all things into consideration, service is the best favorable-attraction producer of them all.

Breezes from Fan in Show Window Turn Pinwheels.

Shaffer & Marsh, electrical dealers and contractors, Hartford, Conn., have an attractive show window that suggests the seasonableness of electric fans. In the center of the window is a large oscillating fan, and in front, on either side, are pinwheels made of colored paper, those on one side being pink and white, and on the other side blue and white. The fan as it turns from one side to the other sets the wheels spinning with sufficient momentum to revolve until the air current returns in their direction.

Who Should Receive the Jobber's Discounts?

Puzzling Questions Regarding the Status of Concerns Which Handle Several Lines or Buy in Quantity for Contract Work

By G. D. Crain, Jr.

A SUCCESSFUL electrical dealer was complaining recently because of what he regards the injustice of the situation whereby other concerns are getting larger discounts than he does from a leading manufacturer of electrical fixtures, whose goods are in demand at present because of an aggressive advertising campaign.

"I have been pushing this line," he said, "and believe in it enough to do a great deal of advertising for it on my own account. I have a salesman on the street working up prospects, and I believe that my business is the largest in town, as far as this particular item is concerned. Yet I know that two or three other concerns, which buy a few of these fixtures get an extra five-per-cent discount because they claim to be jobbers. It doesn't seem fair to me."

The dealer referred to makes no pretensions regarding handling a jobbing business, though his volume in this particular case happens to be greater than that of two houses listed in the directories as jobbers. But one of these, while it occasionally employs a traveling salesman, relies almost exclusively on its local merchandise sales and contract work for its business. The other, while undoubtedly a large jobber of merchandise, likewise sells at retail and does a considerable amount of contracting.

This case, which is typical enough to warrant some analysis, suggests the difficulty which manufacturers are having in deciding who is entitled to jobbing discounts. It is probably true that a good many houses which have succeeded in having their names listed as jobbers for directory purposes are not really wholesale distributors in all that the word usually implies, and, if this rating is being accepted at its face value, their competitors, who are not and do not pretend to be anything except dealers, are being put at a disadvantage.

This, however, is a comparatively simple phase of the question, for it involves a greater or less degree of misrepresentation, and this can be eliminated by the simple plan of having the manufacturer scrutinize carefully all those who ask for discounts on a jobbing basis. The latter is probably familiar enough with his accounts to know who are the real jobbers, and can, therefore, avoid giving a pseudo jobber the terms which are supposed to be reserved for those who are carrying a stock and performing the important work of distributing material and merchandise to dealers and contractors.

This point emphasizes, by the way, an important consideration, namely, that there is much to be said in favor of giving discounts by reason of the function performed, as well as because of quantity purchased. That is to say, the jobber, if he is really acting as a wholesale distributor, by carrying a stock and performing a service for contractors and dealers, and who can obtain supplies quickly and conveniently, is entitled to consideration, aside from the question of the amount of his purchases. Whether to give jobbing discounts for jobbing operations or because of quantity orders is the problem.

The operators of the second concern referred to above, which is unquestionably a jobbing house, but also handles other lines of business, such as retailing and contracting, serve to introduce additional factors which complicate the situation. If it is to be given the discounts, irrespective of how much it buys, it obviously has an opportunity to use the lower prices at which it purchases material as a means of obtaining contract work. Putting it differently, enabling this house and others similarly situated to obtain their materials cheaper than the ordinary contractor can get them, on the basis that it is carrying on a jobbing business, is giving it an advantage over the very concerns which it is supposed to serve, by enabling it to figure jobs on a lower basis than they can, and still make money. That jobber-contractors do use their buying facilities for the purpose of meeting competition successfully is undoubtedly true, and it is entirely natural that they should do so.

To meet this situation, it might be suggested that jobbing discounts should only be given when the concern is exclusively engaged in the jobbing business, and if it is doing other kinds of work, such as contracting, it would be dealt with as a contractor rather than a jobber. But this immediately brings up again the matter of the quantity of the purchase, and the status of the concern which is able and willing to buy in large lots. The wholesale price for quantity is a well-defined principle of price-fixing, and in practice is recognized by most manufacturers of electrical materials.

For instance, some large contractors who use immense quantities of metal pipe for conduit work and also require materials such as rubber-covered wire in large lots, are able to get from the manufacturers discounts which ordinarily are enjoyed only by jobbers. The contractors who pursue these methods are really acting as their own jobbers, since they store the materials and hold them against their future requirements. but the reason they are able to buy at a discount is obviously because of the size of the orders which they offer to the manufacturers.

There is some complaint on this score from the jobber, who is immediately deprived of this business, and also from the smaller contractor, who is put at a disadvantage in figuring against the larger buyer by reason of the latter's material costs. It is contended that the jobber is not properly protected, and that this condition furnishes an argument in favor of disregarding quantity and giving jobber discounts only to legitimate jobbers, contractors all paying the same price, irrespective of the amount of their purchases. But the power of the large buyer to get a preferred price, because of the desirability of his business, would make it very hard to put an arrangement of this kind into effect and keep it there.

All of these points suggest the difficulties which are met by manufacturers who are trying to play fair with jobbers, dealers and contractors. They are finding it difficult to decide who is entitled to a discount, and who should be preferred over other customers.

The head of a large successful concern, which is representative in that it has grown from small proportions to fairly large size, and has obtained its growth by expanding in every direction where there was opportunity to do business at a profit, discussed this feature interestingly not long ago.

"We have followed the line of least resistance," he said, "and have taken on various lines of work as we seemed to be warranted in so doing. We formerly were jobbers exclusively, but when we found that a lot of the local contractors were giving their business to outside supply men

—possibly because the latter were not so familiar with credit conditions and were more generous in the extension of credit—we began bidding on some of the work ourselves, for the purpose of getting an outlet for the goods which we jobbed and manufactured on our own account. We have found it necessary, as a practical proposition, to continue this, especially as the amount of goods made in our own shops gradually increased.

"Electrical dealers in this city have not been aggressive in developing retail sales, and we have been leaders in this work, attracting business to our store by general advertising and window displays. We have continued to job, and, while our operations in other lines are generally understood, there seems to be no special objection on the part of those of our customers who are in the contracting business.

"However, from certain standpoints, I can see the inconsistency of the situation, especially when it comes to bidding on work in competition with the contractor who does not enjoy the inside price for his material. It either forces him to go after the smaller jobs exclusively or to go into the market with a big enough order to enable him to buy at a jobbing price and get on even terms with jobbers who are also contractors. When this is done, neither has an especial advantage, but both are doing work outside of that contemplated by their original function.

"My own idea is that the exclusive jobber should be given jobbing prices, and that the contractor who buys for his own use should be given discounts for quantity, to be paid as earned. This would mean billing him at the regular price paid by all, and the rebates or discounts would not be paid until the quantity delivered had reached the required point. I believe such a plan would have the effect of causing the contractor to figure the cost of his material on the gross price, because he could not afford to anticipate possible rebates through additional purchases, and this would relieve other contractors, who were not buying in sufficient quantities to get the minimum price, of competition based on that price."

Another angle on the "exclusive jobber" proposition was furnished in a city where a concern which has always professed to sell only to contractors and to do no installing, was found to be getting business by bidding through a small contractor, who was to furnish the labor, while it supplied the material, the proposal so stating. Although there are jobbing houses in that community which openly bid on contract jobs without incurring the displeasure of contractors, the feeling aroused by the discovery referred to was considerable, and the status of the exclusive jobber hereafter is a matter of doubt.

All of these things have a bearing on the jobbing situation, and serve to emphasize the fact that the manufacturer who is criticised for failing to protect those who are entitled to consideration has no easy task in classifying the numerous claimants for jobbing discounts. This article is not intended to determine who should be rated as such, but only to present the facts for the consideration of those who are interested.

Washing-Machine Demonstration Successful in Louisville.

The Bomar-Summers Company, retailers for the Eden electric washing and wringing machine, has been conducting a demonstration in the office of the Louisville (Ky.) Gas & Electric Company for some time and has been meeting with success. Sales have been satisfactory and machines are being placed in widely distributed parts of the city and suburban sections. The H. C. Tafel Electric Company is distributor of the machine in the Louisville district.

Window-Display Contest Brings Out Original Ideas.

A cleverly executed window display originated by B. H. Clingerman, general superintendent of the Mobile Electric Company, showing the wonderful improvements which have been made in the washing of clothes, has been awarded the first prize of $25 in the window-display contest in which 12 Byllesby properties competed. The Mobile window depicts three stages in the washing of clothes—first, the old system of washing clothes in the river; second, the back breaking way of cleaning clothes by washboard and tub; third, the modern, up-to-date electric washing-machine method.

The second prize of $20 was awarded to the Oklahoma Gas & Electric Company, which company's display was originated by W. P. Jones, general contracting agent. The display consists of an animated female figure operating an electric vacuum cleaner which picks up grains of rice, confetti, etc., dropped on the carpeted floor by a mechanical doll.

The Arkansas Valley Railway, Light & Power Company received the third prize of $15. This display was originated by E. F. Stone, superintendent of the light and power department, and shows the method in which electric power is utilized in the gold-mining districts served by the Arkansas Valley Company. A feature is a painted back drop-curtain showing the scenery of the Cripple Creek district.

All of the displays were so good that it was a matter of some difficulty to make choice. Among the better of the other displays submitted were those of the San Diego Consolidated Gas & Electric Company on electric advertising and window display, Muskogee Gas & Electric Company on house wiring, Louisville Gas & Electric Company on house wiring, Western States Gas & Electric Company of Richmond on power, Northern States Power Company of Sioux Falls on residence lighting.

All of the displays are now being shown at the properties which originated them, after which they will be forwarded to the other properties in turn, so that all Byllesby properties, whether in the competition or not, will have an opportunity of using the displays within the course of a year.

This method has worked out so successfully that similar contests will be held from time to time with the idea of creating frequent changes of novel and effective window displays for all Byllesby properties.

Co-operative Merchandising Plan at Kansas City.

The practice of the Kansas City Light & Power Company, of selling electrical devices at cost, has in the past provoked some ill feeling among dealers and contractors. A new condition of affairs has been attained, however, starting with the campaign of the company to sell three carloads of $3.50 irons at $2 in July. Practically every dealer and contractor is displaying the signs offering irons for $2, payable "nothing down and 25 cents a month." The orders received are transmitted to, and filled by, the Kansas City Light & Power Company. The practice, however, brings customers to the dealers' places, where other goods may be seen and purchased. Scores of irons have been sold, the first two weeks of July, by the dealers, most of them the bargain irons, but a few of them the more expensive offerings of the dealers. It is said that this is only a beginning of the co-operation between the light company and the dealers and contractors.

More than 5,000 of the 10,000 irons bought a year ago by the light company to sell at $2, were disposed of in the first ten days of the sale. It is expected that the present campaign will be as successful.

NEW APPLIANCES

A Weekly Review of the Latest Developments and Current Information Respecting Electrical and Kindred Mechanical Appliances

A NEW METHOD OF OBTAINING POWER-HOUSE CONTROL OF DISTANT CIRCUITS.

The Remote-Control Oil Circuit Switch.

For many years there were few important departures from the old standards of construction and control of distribution and street-lighting circuits, but in the past four or five years many innovations have appeared in response to a strong demand for less expensive, less complicated and less troublesome methods and materials. The street-lighting system was last to be benefited, but now the general acceptance of the tungsten-filament incandescent lamp and the pole-type series regulator have greatly simplified street-circuit construction and operation, which can now, in many instances, be improved further by the use of some type of the patented remote-control oil circuit switch, now being manufactured and placed on the market by the South Bend Current Control Company, South Bend, Ind.

Fig. 1.—Remote-Control Oil Switch with Case Broken Away to Show Interior.

The accompanying illustration (Fig. 1) shows a typical switch, with case cut away to show the details of construction. It will be noted that the mechanism is simple and strongly built. The case follows closely the standard transformer-case design, and for either pole installation or subway use is installed to conform to transformer practice.

The mechanism is carried by a frame of kiln-dried maple, boiled in oil, thus combining strength with high insulation. All switches are tested to withstand 10,000 volts between current-carrying parts of opposite polarity and between these parts and the case. The switch makes and breaks contact under oil. This oil is of a special type developed for this class of service, and which fills the case to the line indicated in the illustration.

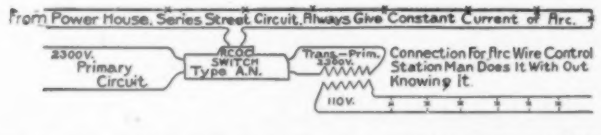

From Power House, Series Street Circuit, Always Give Constant Current of Arc.
2300V. Primary Circuit
A.C.O.C. Switch Type A.N.
Trans.—Prim. 2300V.
Connection For Arc Wire Control Station Man Does It With Out Knowing It.
110V.

Fig. 2.—Type AN Switch Controlling Low-Voltage Multiple Lighting Circuit.

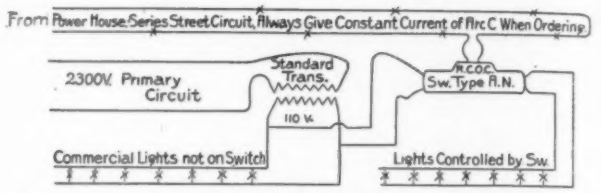

From Power House, Series Street Circuit, Always Give Constant Current of Arc C When Ordering
2300V. Primary Circuit
Standard Trans.
110 V.
A.C.O.C. Sw. Type A.N.
Commercial Lights not on Switch
Lights Controlled by Sw.

Fig. 3.—Switch Controlling Part of Multiple Lighting Circuits.

While in service the switch may be momentarily opened and closed, for purposes of test or synchronizing with other switches, by unscrewing the cap on the pipe nipple in the case lid and pushing down the fiber plunger which forces closed a spring contact, thus short-circuiting the solenoid coils and allowing the switch to open. The contacts normally act as a lightning gap back of the solenoid coils, thus preventing burnouts.

The solenoid coils are in series with each other and, when the switch is installed, are cut in series with the series street circuit wire (or other control wire), thus being energized when a street circuit is started, which causes the switch to close and remain closed until the street circuit is "pulled off," thus giving corresponding service periods on the controlled circuit. This is the simple form or type AN switch.

The addition of a simple but positive locking mechanism converts the type AN switch to the locking or type MN switch, and its use makes it practicable for the power-house operative to open or close the switch at times different from the street circuit lighting hours. This is done by "winking" the control circuit,—which means to open for an instant the series or control circuit switch at the power house.

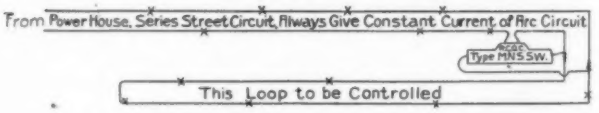

From Power House, Series Street Circuit, Always Give Constant Current of Arc Circuit
A.C.O.C. Type MN S.W.
This Loop to be Controlled

Fig. 4.—Switch Controlling One Loop of a Series Circuit.

Various other modifications of this switch are made to cover special conditions. The accompanying diagrams illustrate some of the operating methods made possible by the use of some type of this switch.

Tree Grounds Are Greatly Reduced.

Fig. 2 shows a type AN or simple switch controlling the primary connections of a standard lighting transformer, the secondary current being used to feed a low-voltage multiple street-lighting circuit in districts where the use of a high-voltage series wire would result in serious "tree ground" troubles.

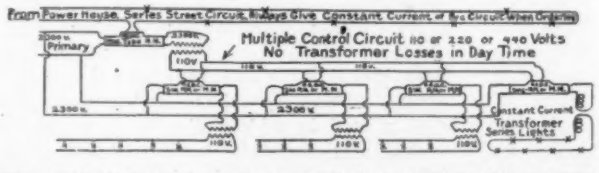

Multiple Control Circuit 110 or 220 or 440 Volts
No Transformer Losses in Day Time
2300 V. Primary
110V
2300 V.
Constant Current Transformer Series Lights

Fig. 5.—Switch Used as Master Switch to Control Other Circuit Switches.

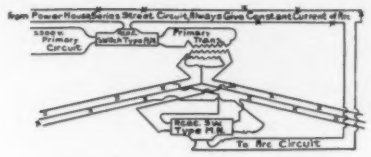


Fig. 6.—Upper Switch Controls All-Night Lamps. Lower Switch Controls Short-Hour or Special Lamps.

Fig. 3 shows a type AN switch controlling a secondary multiple circuit, as when the same transformer is also used to supply current for commercial lighting.

Park Lighting Circuits.

By using a single-pole type MNS switch as connected in Fig. 4, the street series circuit may be made to open or short-circuit one of its own loops, thus cutting on or off the lights on this loop as may be desired. This system is used for controlling series loops of park lights.

Power-House Control of Substation Circuits.

Some types of moving-coil and all types of fixed-coil series-circuit regulators or constant-current transformers are now so constructed that they can be controlled from a distance and do not require the presence of an attendant. Consequently they can be installed in a substation or on a pole remote from the power house. When several such regulators are to be controlled the use of a set of RCOC switches connected as Fig. 5, either with a master switch, as shown, or with all switch coils

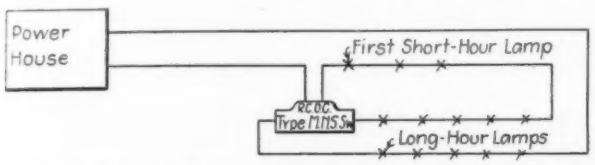


Fig. 7.—Switch for Cutting Out Short-Hour Lamps on Series Circuit.

cut into the series control circuit from the power house, gives power-house control and often saves miles of expensive construction. It also eliminates transformer core losses during the day and reduces the liability of lightning troubles because the transformers are cut out of the circuit except during lighting hours only.

Use Low-Voltage Multiple Post Lights for Economy.

The great cost of high-voltage underground construction and the undesirability of overhead connections to ornamental post or "boulevard" units that are now so popular, makes the comparatively inexpensive low-voltage underground system very desirable where the proper switching control can be secured without extending the underground circuit long distances to the control point. This also eliminates the cost and unreliability of outdoor time-switch control or hand switching by watchmen or police.

Fig. 8.—Remote-Control Oil Switch Ready to Install on Pole.

By using RCOC switches, multiple low-voltage systems are controlled by means of a loop to the switch from the nearest series street circuit, thus giving power-house control. Fig. 6 shows at the top a type AN switch controlling the primary of a standard lighting transformer that feeds a three-wire system of single-light posts. A type MN (locking) switch controls one circuit of the split secondary. When the series circuit is started both switches will close, starting all post lights.

At midnight (or any other hour desired) the series circuit is "winked," which causes both switches to open, but the type AN switch closes at once, while the type MN locks open, thus cutting out alternate posts but leaving the three-wire load still balanced.

At daybreak, when the series circuit is "pulled off," the type AN switch opens, thus cutting out all post lights. Both switches now reset themselves to close when the series circuit is closed the next time.

When desired, the transformer can be used to supply commercial lights as well as post lights. In such a case the type AN switch would not control the primary, as shown, but would control the outside wires of the three-wire secondary back of the taps through the type MN switch. This method is used, among other places, at Madison, Wis., to control an extensive system of multiple post lights where both overhead and underground circuits are controlled perfectly by these switches.

The type MNS switch is also used in connection with series white-way street-lighting systems where it is desired to turn off some of the lamps at 11 o'clock, midnight, or other hour, while the remaining lamps burn all night. In this case, instead of running two series circuits from the power house, one extra panel and the copper from the first short-hour lamp back to the power house can be saved, thus paying for the cost of the switch several times in reduced cost of the installation. Fig. 7 shows this idea.

The RCOC switch is giving satisfactory service in numerous cities, and carries a liberal guarantee. The manufacturers are so confident of its reliability that they are ready to install it on 30 days' trial. These swicthes are comparatively inexpensive, considering their excellent design and construction and the economies that can be achieved by their use.

Sockets with Porcelain Bushings.

Recognizing the demand for a porcelain bushing that would serve the double purpose of insulating socket caps and at the same time serve as a strain-relief device for the cord, the firm of Harvey Hubbell, Incorporated, Bridgeport, Conn., has placed on the market a new line of standard sockets equipped with such bushings. These sockets are made with either the Hubbell Presturn or Quick-Catch shell fastenings. In the accompanying illustration is shown quite clearly the manner in which this new bushing serves as a strain relief. This new development will be of special value where a superior insulation is desired in the socket.

Socket with Porcelain Bushing.

Diaphragm-Type Pressure Regulators.

In the illustrated description of a line of diaphragm-type pressure regulators which appeared in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of July 1 a statement was made that these regulators were made by the Westinghouse Electric & Manufacturing Company. This is incorrect, since these regulators are a product of the Cutler-Hammer Manufacturing Company, of Milwaukee, Wis.

New Electrically Operated Remote-Control Switch.

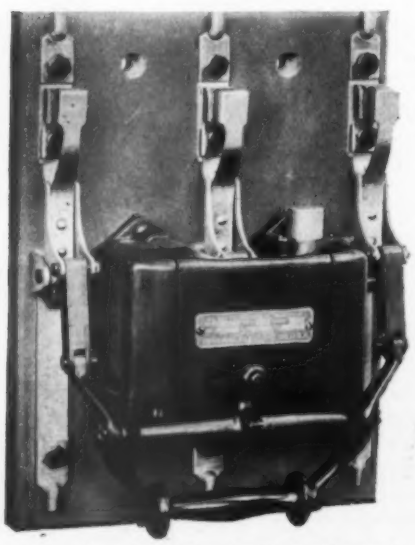
A new type of electrically operated remote-control switch has been developed for the central control of lighting circuits, motors not subject to heavy overloads, and other electrical apparatus located at a distance from the controlling button or buttons. This switch is particularly advantageous for use in motion picture and other theaters, halls, stores, libraries and like places where centralized control for light work is desirable. As this particular switch takes care of loads too heavy for the ordinary snap switch, it is widely used in installations like the New York State Educational Building, Albany, N. Y., and the new office buildings of the Bankers Trust Company, New York City, and the Prudential Life Insurance Company, Newark, N. J., where it has already proved very efficient.

Control may be centered in one special push-button switch or in different locations by the use of a number of these push buttons, wired in multiple. This special control button operates at finger pressure and sends current through the two solenoid coils on the switch only at the moment of opening or closing. It is a single-pole, double-throw, specially designed push button and is normally in the open position. It remains closed only when held by the operator. One such switch, with escutcheon plate ready for wall mounting, is furnished as part of the full equipment and must be used as the solenoid coils are not intended to carry current continuously. Little current is used for operation.

One of the coils opens the switch and the other closes it. This approximates on direct current 1.6 amperes at 110 volts and 0.81 ampere at 220 volts and on alternating current of 60 cycles, 10 amperes at 110 volts and 6 amperes at 220 volts. The device is made specially for use on currents of the above voltages. There is also an insulated handle on the switch to permit manual operation, if this should ever be necessary.

The switch itself is a self-contained unit with two sets of contacts. The main set has special laminated-copper brushes that make an "end on" contact with the switch blade with no tendency to force the laminations apart. The cross section of the brushes is correct for the current they are designed to carry and the arrangement permits a firm, strong, closing contact. The contact surfaces are kept bright and good contact is assured by the wiping effect given the contacts every time the switch is closed. The secondary set of contacts take the arc on breaking the current. They are of blocks of selected carbon fastened without screws or bolts to flat phosphor-bronze strips, shaped into holders at their upper ends. Thus the switch is protected and great durability attained. The spring tendency of the bronze strips, which are under considerable pressure when the switch is closed, assist to make a quick, clean break when it opens.

The temperature of the switch will not rise more than 30 degrees centigrade above that of the surrounding air, provided the leads to which the switch is connected do not heat above that point. In appearance and construction, this switch resembles an overload air-break circuit breaker, but the overload coil is replaced by special opening and closing coils that act directly on the switch mechanism. All live parts are finished in polished copper. The mechanism is dead black. The switches are made single-throw and either single, double or triple pole. They are known as type R, form C, and were developed by the General Electric Company, Schenectady, N. Y. They meet the specifications of the National Board of Fire Underwriters.



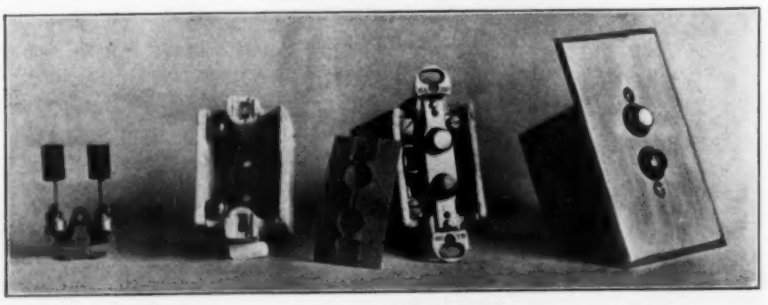
General Electric Remote-Control Switch.

Condenser-Type, Direct-Current Lightning Arresters.

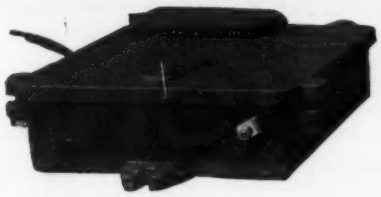
The arresters illustrated herewith, designated as type K-3 and recently placed on the market by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., are for use on direct-current voltages from 100 to 1,500. They are especially adaptable for the protection of direct-current railway and power motors, generators and rotary converters. When properly connected they are also of value in preventing flashovers on the commutators of rotary converters. They are furnished for car, pole, or wall mounting.

These arresters are the result of several years' experience with a condenser arrester known as the type K, which has proven eminently successful in the protection of apparatus under the most excessive static conditions prevailing in any part of the country. The K-3, however, due to later developments in the method of building condensers, is smaller in size, of less weight, and of greater electrostatic capacity than the type K.

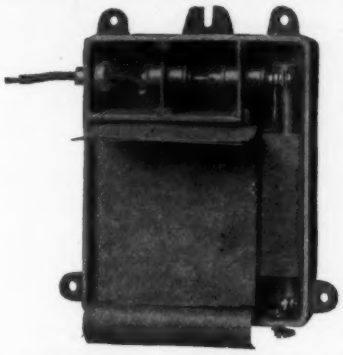
Type K-3 arresters are made in two forms, one consisting of a condenser with a spark gap in series and a high resistance in shunt with it and intended for car and station service, the other consisting of the condenser alone without series gap or shunt resistance for line mounting. The condenser is of the flat plate form, of high electrostatic capacity and amply tested for breakdown voltage. For car mounting, the condenser is of 1-microfarad capacity, equivalent to the capacity of 100 miles of average line. For line mounting the capacity is 0.3 microfarad, equivalent to the capacity of 30 miles of average line. In the line-mounting form, without gap or resistance, the condenser is connected direct to the line and ground terminals. In the forms that include gap and resistance, the line terminal is connected through an adjustable spark gap in a separate chamber. This gap is in series with the condenser, the ground lead being connected to the case, and a resistance is connected in shunt across the condenser, serving to keep it discharged



Parts of and Assembled Push Button for Remote-Control Switch.



Condenser-Type Direct-Current Lightning Arrester.



Cover Removed, Showing Arrester Spark Gap.

to zero value. This resistance is so high that even with the spark gap closed only a negligible amount of direct current can flow. The spark gap provides a means of noting the discharge of the arrester by placing a test paper in the gap. It can be easily adjusted and set so close as to just prevent line voltage from bridging it.

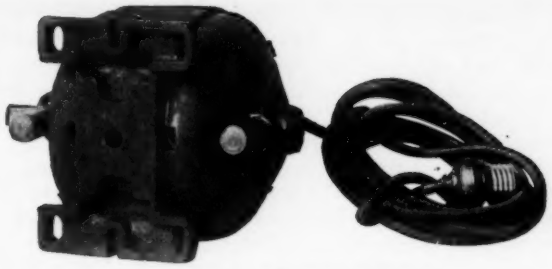
Both forms of these condenser-type arresters are mounted in a rectangular cast-iron box with waterproof cover. The spark-gap chamber is accessible by removing a small separate cover. They are easily mounted underneath or on roof of car, and in any position on car, pole, or wall.

Westinghouse Splashproof Motors.

A line of small alternating-current motors that are splashproof, known as the type CAH, has recently been placed on the market by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. These motors are particularly adapted for use on washing machines, dish washers, water pumps, and the like, and are designed with a view to meeting satisfactorily the most exacting requirements.

As will be seen from the illustrations, the frames of these motors are so constructed that it is next to impossible for water to get into the motor. Forced ventilation, along the same lines as that successfully used in turbogenerator design, is obtained by a small blower and ample ducts, fully protected from liquids and small objects. Thus the frames keep them dry and the fans keep

Splashproof Motor.



Under Side of Splashproof Motor.

them cool under all operating conditions. There are no exposed electrical contacts, connections being made through cable or binding posts fully insulated against accidental shock. There are no rotating electrical contacts or brushes, thus decreasing renewals and amount of attention required. Starting is effected by means of a switch that is frictionless, except at the instant of opening or closing, making wear negligible. The operation of the switch is snappy and the break quick. Lubrication is furnished by oil cups of unusually generous capacity.

These motors are sturdy, light, reliable, simple and easily operated; they possess a high starting effort, have ample turning effect to overcome peak load, and are of high efficiency and power-factor. They may be arranged for side or inverted mounting by rotating the end brackets, and are provided with slotted feet for two-point mounting in addition to holes for four holding-down bolts. Direct-current motors can be furnished mechanically interchangeable with the alternating-current motors. Either a Hubbell attachment plug and 10 feet of reinforced cable, or insulated binding posts are furnished with each motor.

Automatic Electric Fare Register.

The new electrically operated cash fare box recently successfully tried out on the Belleville, Ill., lines of the East St. Louis & Suburban Railway seems to meet more of the essential requirements of a device of this kind than anything thus far placed on the market. Officials of the company, who have closely watched its operation, report that

Automatic Electric Fare Register in Use.

in no instance has the mechanism failed to perform, and the operatives of the cars have taken to the equipment easily and are working in perfect harmony with it. One operative of a Belleville car does the double duty of motorman and conductor. A bell near his seat notifies him when the proper fare is put into the box.

Simplicity characterizes both the installation and operation of the device. The box requires absolutely no attention from the conductor, or motorman, when the cars are run by one man. This feature is of especial value where heavy and complicated traffic is handled. The conductor is released from any movement in connection with fare collection, thus being able to devote his entire attention to passengers and getting his car in motion.

Boxes on the Belleville lines are adjusted to receive nickels only. A single five-cent piece dropped in the box registers and rings the bell once. If a handful of nickels is dropped in simultaneously, the mechanism performs the exact number of times corresponding with the number of coins and registers and rings as accurately as if the fares were put in at intervals. There are other models of this device, however, which receive and register nickels, dimes and even quarters. If a dime is inserted, a double fare is registered on the dial, and simultaneously there are two strokes of the bell. When a quarter is received, the single performance is multiplied by five.

There is an attachment which takes care of fares other than those paid in cash. This is inside the box and does not increase its size, the only outward evidence of it being a small button, which, when pressed by the conductor, registers on another dial. The makers also have a model which receives and registers pennies, five of the baser coins registering the same as one five-cent piece.

The box proper is compact and trim in appearance, being cast in aluminum. It is mounted on a steel tube and can be placed in any position on the platform. The top is conical to the opening for the coins. The sides are fitted with glass windows through which the coins can be seen before they drop into the main body. The contact is formed, however, immediately upon the coin entering the opening, and the bell sounds before the passenger has withdrawn his hand. The register dials are placed over the door of the car, in the customary position, and are not materially different from those generally in use where the conductor jerks a cord to record fares collected. With the new device he is relieved of all responsibility respecting fares except to see that passengers deposit the fare.

Power for operating the electrical mechanism in the boxes may be supplied by a storage battery of small dimensions, which is placed under one of the seats, or can be taken directly from the circuit used in propelling the car.

The box is the invention of Adolphus D. Branham, who conceived the idea about twelve years ago, and has devoted his entire time since to its perfection. It is fully covered by patents and is being marketed by the Automatic Register Company, Security Building, St. Louis, Mo.

View in Testing Room of the Electric Cable Company's Factory, Bridgeport, Conn.

The manufacture of rubber-covered wire and cable has made great advances since the testing room became a regular feature of the wire factory. Such a room is shown above and its importance is emphasized by the following statement from Mr. Moore, president of the Electric Cable Company: "The real test for efficient, painstaking manufacture of rubber-covered wire is applied in this room. The process of manufacturing good wire begins in the research laboratory, where insulating compounds are designed and then carried to the chemical laboratory to be worked out. The formula produced in these laboratories is passed to the mixing room and governs the mixing process as well as the application of the compound to the wire itself. A formula may meet every scientific requirement of the laboratory, but its practical value is not determined until it reaches the testing room. Here the wire is immersed in water for 24 hours before the testing current is turned on. We regard this branch of our business as most important. We consider ourselves personally responsible for every bit of wire that leaves our plant, and all tests are made on that basis. Every foot of wire is tested so as to meet our self-imposed standards in all of its electrical and physical properties. Each coil is numbered and its individual test recorded in our files. Whenever requested, we will furnish a certified copy of tests on each particular coil. As additional identification and protection to the purchaser, Ecco wire is marked on the outer surface of the braid every three feet, showing name and grade. As a matter of good business, our whole plant is operated on the basis of delivering an excess of quality, and we are constantly improving our laboratory and testing work to advance the insulation qualities of our product beyond the demand of existing engineers' requirements. Modern manufacturing, in all things pertaining to electricity, requires constant watchfulness and advancing standards to meet the tremendous increase of use and the many different demands of that industry. Insulated wire carries electrical current from the point of generation to the point of use, and therefore it is one of the most important items of this tremendous industry—in reality an artery of industrial life."

INDUSTRY ACTIVITIES

Splitdorf Electric Company, of Chicago, Ill., has changed its name to the Spitdorf Service & Sales Company.

Westinghouse Church Kerr & Company, engineers and constructors, 37 Wall Street, New York City, have issued a folder illustrative of the construction of the shops of the Peerless Rubber Manufacturing Company. Production was not stopped while the new buildings replaced the old.

The Arrow Electric Company, Hartford, Conn., has issued its new catalog No. 17, which is being distributed to the trade. The catalog has been reduced to pocket size and issued in both bound and loose-leaf form. It contains a very complete and up-to-date listing of wiring specialties and includes a number of additions to the company's line of sockets, switches and receptacles.

The Davis Slate & Manufacturing Company, of Chicago, Ill., is building at Muskegon, Mich., a modern plant for the milling of electrical slate, which will be operated in addition to its factory in Chicago. It is proposed to ship the semi-finished blocks from the quarries to Muskegon, where the most modern machinery, low cost of power and exceptional shipping facilities will greatly improve the service to the trade, without increasing the cost of production.

The Vulcan Soot Cleaner Company, Du Bois, Pa., has just published a catalog devoted to its Vulcan soot cleaner which is really a handbook on the subject of boiler operation. The catalog is divided into several sections, section I discussing the question of what soot really is. Section II gives the results of a number of tests and investigations on the effect of soot deposit on efficiency of heating surface in boilers, superheaters and economizers, demonstrating the value of clean heating surfaces from a commercial standpoint. Section III shows how soot cleaning can be accomplished, giving data on the fundamental requirements, etc. The remaining sections deal with the detail construction and operation of the Vulcan cleaner.

Victor Electric Corporation has been incorporated in the State of New York with an authorized capital stock of $2,500,000, divided into first preferred, $750,000; second preferred, $500,000, and common, $1,250,000. The incorporators are: Herbert S. Blake, of Herbert S. Blake & Company; William Leslie, of Leslie, Banks & Company, chartered accountants, and Harry E. Hanes, president of the Standard Appraisal Company, all of New York City. The company has purchased the business and property of the following concerns: Victor Electric Company, of Chicago and New York City; Scheidel-Western X-Ray Company, of Chicago and New York City; Macalaster-Wiggin Company, of Cambridge, Mass., Chicago, and New York City, and the Snook-Roentgen Manufacturing Company, of Philadelphia and New York City. The permanent officers will be: Charles F. Samms, president; Clinton W. Howe, vice-president; H. Clyde Snook, vice-president; Frank H. Swett, vice-president; Fred A. Wiggin, treasurer; Theodore B. McClintock, secretary and manager of sales.

Bridgeport Electric Manufacturing Company, Bridgeport, Conn., the officers of which are Carl Cyrus, president; P. Bergen, vice-president; A. P. Nichols, treasurer and manager; George Nichols, secretary, and Herman Tygesson, superintendent, has leased the patents of the Geyser Patent Holding Company and has equipped a new factory at Washburn and Carbon Streets, Bridgeport. The company will have about 5,000 square feet of floor space, and have a factory completely equipped with new and modern machinery and tools. The factory will have an output of at least 100 complete heaters per day. These heaters have been on the market long enough to have been thoroughly tested as to durability and efficiency, and shipments have been made to Australia, New Zealand, Cuba and all parts of the United States. Some heaters have been in continuous operation in the Forty-fifth Street power station of the United Electric Light & Power Company, New York City, for over two years, giving perfect satisfaction.

The Hughes Electric Heating Company, Chicago, Ill., has inaugurated the publication of a monthly house organ which is called *Daisy Dayload*. It is the intention of the company, as expressed in the initial number, to present to central-station companies the facts and figures in a human-interest manner that will aid them in building up an electric-cooking load. It is stated by the editor that "In keeping with its unselfish name it will strive to develop electric-cooking loads, with improved suggestions on electric-range merchandizing,—rather than promote the particular interest of the Hughes company." The publication is a four-page illustrated folder arranged in an attractive manner. The feature article describes a three-day campaign in a city of 4,000 inhabitants which resulted in the sale of forty-three ranges. It is announced, in this issue, that the Hughes Electric Heating Company has started the construction of a new factory building at Waller Avenue and Taylor Street, Chicago, which will cost $150,000. The new building will greatly enlarge the manufacturing facilities of the company and will be ready for occupancy on December 1, 1916. Freling Foster, advertising manager of the Hughes company, is the editor of the new publication.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received the contracts for the complete electrical equipment for three large double-leaf bascule lift bridges for the City of Seattle. These bridges will span the Lake Washington Canal and will be among the largest of their type yet built. Each bridge will have a total over-all length of 291 feet, with a 200-foot span, and will be 60 feet above the water. Each bridge will be made to carry both vehicle traffic and a double-track street railway, and will be constructed of concrete piers with structural steel for the span. The electrical equipment for each bridge will consist of four 100-horsepower, main operating motors, together with a smaller motor for operating the centerlock. Two main operating motors will be connected permanently in series on each leaf and will have switches so that if one motor fails it may be cut out and the other motor left to operate the bridge. Either motor alone will be capable of raising the leaf at reduced speed. The motors on each leaf will be controlled by a magnet switch controller regulated by a master switch located in an operating house on the leaf. There will be an operating house on each leaf, designated as north and south operating house. Control panels and master switches will be installed in each. Each main operating motor will have a weatherproof brake mounted on it. For the centerlock a varying speed, series-wound, direct-current motor will be used operated by a drum controller located in the south operating house. The installation and erection work will be done by local sub contractors in the city of Seattle.

LATEST APPROVED FITTINGS

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association

CUTOUT BASES, Cartridge Fuse. —Metropolitan Engineering Company, 1238 Atlantic Avenue, Brooklyn, N. Y.

Sealable service and meter cutout bases, designed to prevent theft of current and to facilitate meter testing.

"M. E. Co." 0-30, 31-60 and 61-100 amperes, 250 volts, catalog Nos. 140-42; 145 with spring contacts for meter-testing plugs.

When used at service entrances a fused service switch is also required.

Also terminal protectors, catalog Nos. 9001-06, 9010-11.

Listed June 16, 1916.

CUTOUT BASES, Plug Fuse.—Bryant Electric Company, Bridgeport, Conn.

"Bryant or Perkins," short-circuiting plug, catalog No. 559, having screw shell and center contact made of one metal piece about a porcelain button, and with provision for soldering metal piece to screw of plug-fuse cutout base.

The removal of plug should be prevented either by soldering it to screw shell of cutout base or by crimping outer edge of screw shell of cutout base over edge of plug.

Listed June 16, 1916.

FITTINGS FOR CUTOUT BASES, Supports.—J. B. Hannan, 4835 Forrestville Avenue, Chicago, Ill.

This device consists of a piece of sheet steel, slotted to receive mounting bolts, and with formed legs whereby a cutout base may be secured one inch above surface of a cutout box or cabinet.

Listed May 16, 1916.

INSULATING MATERIALS. — Keyes Products Company, 120 Broadway, New York, N. Y.

"Fire-Resisting Nevasplit" fiber panels; impregnated fiber sheets about ¼ inch or ½ inch thick. These sheets are brown and are painted yellow on one side.

This material is slow burning, but not strictly non-combustible; is chemically stable; is not materially affected by temperature below 250 degrees Fahrenheit or by oils or acids, and is practically neutral. Its surfaces when charred are conducting. Its dielectric strength and absorption of moisture are about same as of ordinary fiber sheets. It does not conduct heat so readily as wood, fiber or asbestos board. Although fairly brittle and somewhat inferior to wood in its behavior under tools it has moderate mechanical strength.

Standard for barriers, shields, linings and similar protective parts of electrical appliances where not depended upon for support of current-carrying parts and where a material having above-listed properties is suitable.

Listed June 16, 1916.

LAMP CLUSTERS. — Benjamin Electric Manufacturing Company of Canada, Limited, Toronto, Ont.

Wireless clusters with porcelain bases and removable porcelain rings. "Benjamin." 660 watts, 250 volts. Multiple types, 1, 2, 3, 8, 3-T. Series types, 1½, 2½, 3½-T.

Listed May 10, 1916.

METAL MOLDING FITTINGS. —Appleton Electric Company, 212 North Jefferson Street, Chicago, Ill.

Fittings for use with "Pagrip" metal molding, catalog Nos. 115, 450.

Listed June 16, 1916.

PANELBOARDS. — Ritter Dental Manufacturing Company, Rochester, N. Y.

A dental switchboard equipped with inclosed cartridge fuses, flush switches and regulators controlling taps from a low-voltage transformer; for operation of full-voltage dental appliances. On direct-current supply circuit a special inclosed rotary converter is used. "Columbia."

Ratings: Transformer, 100 watts, 125 or 250 volts; rotary converter, 1.6 amperes, 12 volts; full-voltage circuits, each 3 amperes or less, 125 volts.

Listed June 16, 1916.

PLUG FUSES. — Union Electric Company, Trenton, N. J.

Edison plug fuses, 0-30 amperes, 125 volts.

Listed June 16, 1916.

PORTABLE FLEXIBLE CORD FOR ELECTRIC HEATERS. — Indiana Rubber & Insulated Wire Company, Jonesboro, Ind.

Marking: One black thread in cotton wind. Tag on coil to read: "National Electrical Code Standard."

Listed May 16, 1916.

RECEPTACLES, Standard. — Benjamin Electric Manufacturing Company of Canada, Limited, Toronto, Ont.

Porcelain shell keyless. 660 watts, 600 volts, catalog No. 88. 1,500 watts, 600 volts, catalog No. 698.

Listed June 16, 1916.

RECEPTACLES, Standard. — Connecticut Electric Manufacturing Company, Bridgeport, Conn.

"C. E. M. Co." porcelain shell.

Key, 660 watts, 250 volts, catalog No. 11034.

Listed March 21, 1916.

SIGNS, Electric.—The Golden Company, 2026 Tilden Street, Chicago, Ill.

Portable electric window display sign having a sheet-metal body, on face of which are mounted a number of candelabra sign receptacles connected in series to a length of armored cord and a separable attachment plug. 660 watts or less, 110 volts.

Listed May 10, 1916.

SIGNS, Electric.—The W. H. Stubbings Company, 289 Stark Street, Portland, Ore.

Electric signs shown by tests and examinations to be in accordance with the requirements of the National Board of Fire Underwriters have labels attached.

Listed June 7, 1916.

SOCKETS, Standard.—Pass & Seymour, Solvay, N. Y.

"P. & S." Porcelain shell sockets. Key, 250 watts, 250 volts, catalog No. 61227.

Listed June 1, 1916.

SOCKETS, Weatherproof.—General Electric Company, Schenectady, N. Y.

"G. E. Co." For temporary decorative work only, 1,500 watts, 600 volts, catalog Nos. 159376-78.

Listed May 27, 1916.

SWITCHES, Fixture.—Bryant Electric Company, Bridgeport, Conn. "Bryant" or "Perkins" chandelier switches. Adaptations of the standard Bryant pull-socket mechanism for attachment to threaded stems of canopies, clusters and chandelier bodies. Pull switches, 3 amperes, 125 volts; 1 ampere, 250 volts; catalog No. WT-91.

Listed June 13, 1916.

SWITCHES, Push-Button Flush.—Manhattan Electrical Supply Company, 17 Park Place, New York, N. Y.

Single-pole, 10 amperes, 125 volts; 5 amperes, 250 volts; catalog No. 5011.

Listed June 13, 1916.

SWITCHES, Combination Cutout.—Connecticut Electric Manufacturing Company, Bridgeport, Conn.

"C. E. M. Co." Three-pole switches with plug fuses, 30 amperes, 125 volts, catalog Nos. 1504, 15014.

Listed June 15, 1916.

SWITCHES, Combination Cutout.—Metropolitan Engineering Company, 1238-1252 Atlantic Avenue, Brooklyn, N. Y.

"M. E. Co." Combination sealable service switches and cutouts having a fuse in each line and special handle whereby all may be withdrawn simultaneously when device is used as a switch. 0-30, 31-60 and 61-100 amperes. 250 volts, catalog Nos. 140-42, 145 with spring contacts for meter-testing plugs, catalog Nos. 701-03, three-wire. Also terminal protectors, catalog Nos. 9001-06, 9010-11, 9020-30.

Listed June 17, 1916.

PERSONAL AND BIOGRAPHICAL

MR. G. P. EGLESTON has been appointed business agent for the Coast Counties Gas & Electric Company, at Santa Cruz, Cal.

DR. L. A. HERDT, professor of electrical engineering at McGill University, recently underwent a minor operation at the Royal Victoria Hospital, Montreal.

MR. L. E. WHITTEMORE, who has been pursuing special studies in wireless telegraphy at the University of Kansas, has been placed in charge of a department given to that subjecst.

MR. C. D. EMMONS, formerly general manager with the Chicago, South Bend & Northern Indiana Street Railway Company, has assumed his new position as general manager of the Boston & Worcester Street Railway in Massachusetts.

MR. F. H. CHAMBERLAIN, general manager of the Alabama Power Company, resigned his position on July 1 to accept a position with a large chemical company. Mr. Chamberlain has been with the power company for a number of years. His successor is to be named by James Mitchell, president of the company.

GENERAL MORRIS SCHAFF, a member of the Massachusetts Gas and Electric Light Commission, has received the honorary degree of doctor of letters from Otterbein University, Westerville, O., where he was a student 60 years ago. General Schaff also holds the degree of LL. D., conferred by Williams College several years ago.

MR. G. H. LIEBEL has resigned his position as branch manager of the Robbins & Myers Company, of Cincinnati, O., to become president and treasurer of The Liebel Manufacturing Company, of Cincinnati, recently incorporated, which will manufacture a line of transformers, X-ray machines and electrotherapeutic equipment.

MR. W. J. BARKER, vice-president of the Denver Gas & Electric Company, has been selected to receive Colorado contributions towards the fund to be used in lighting of the Statute of Liberty. Since contributions will be received from every state in the Union, Mr. Barker is anxious to have Colorado make as good a showing, as far as number of individual contributors are concerned, as any of the other states.

MR. HOWARD CASE, of Wichita, Kans., was recently elected a director of the Kansas Gas & Electric Co., of Wichita, succeeding MR. J. O. DAVIDSON, and MR. A. H. DENTON, of Arkansas City, was elected a director to succeed MR. A. C. STICH. Both Mr. Davidson and Mr. Stich have died within the year. MR. V. M. WILEY, of Hutchison, was added to the directorate.

MR. GEORGE F. DAGGETT, of Brooklyn, who has been connected with the Public Service Commission for the First District of New York practically since its creation in 1907, and most of the time as its chief clerk, has been promoted from that position to become an assistant secretary. Mr. Daggett has entire charge of the work of handling informal complaints against transportation companies filed with the Commission.

MR. JAMES R. STRONG, who is chairman of the General Convention Committee for the annual convention of the National Electrical Contractors' Association, to be held July 19 to 22 at the Hotel McAlpin, New York City, has been president of that Association during three terms. Mr. Strong is president of the Tucker Electrical Construction Company, of New York City. He was graduated from Trintity College in 1882 and shortly after graudation entered the shops of the Watts-Campbell Company, engine builders, Newark, N. J., and subsequently the shops of the United States Electric Light Company of the same city. In 1884 he became superintendent of construction for the United States Illuminating Company, of New York City, in which

James R. Strong.

capacity he continued for six years, at the end of which time he became president of the Tucker Company, which under his guidance has executed some of the largest electrical construction contracts in the city of New York. Mr. Strong is an associate member of the American Institute of Electrical Engineers, a member of the Building Trades Employers' Association of New York and a number of social organizations. In the past he has labored unremittingly in the interests of the National Electrical Contractors' Association and the work he has done preceding this year's convention will undoubtedly be appreciated by the many delegates who will be in attendance.

MR. C. ERNEST GREENWOOD has been appointed superintendent of the appliance department of the Edison Electric Illuminating Company of Boston, succeeding MR. W. GRAYDON STETSON, who has resigned to enter another sphere of work. Mr. Greenwood has been connected with the sales department since 1906, and for the past three and a half years has been editor of the publication *Edison Life*, one of the most attractive house organs in the country. In addition, he has worked with great success in securing the substitution of Edison current in place of isolated industrial plants. He is a native of Boston, and graduated from Harvard University in 1904. During June of this year he was a member of the Officers' Training Camp at Plattsburg, N. Y. Mr. Greenwood is a member of the National Electric Light Association and other organizations, and is a talented vocalist.

MR. W. GRAYSON STETSON, for several years superintendent of the Boston Edison Company's appliance department, has resigned to accept a responsible executive position, August 1, with F. W. Bird & Son, Walpole, Mass. This concern is a large manufacturer of building papers, and in addition Mr. C. S. Bird, the present head of the firm, is owner of the Boston *Advertiser* and *Evening Record*. Mr. Stetson's duties will include a general oversight of the various properties. During his connection with the Edison company the appliance business has been greatly developed and many successful campaigns have been carried on, among them being the introduction of about 500 electric ranges. Mr. Stetson's friends wish him great success in his new field.

OBITUARY.

MR. JAMES H. SIEBERLING, president of the Indiana Rubber & Insulated Wire Company, Jonesboro, Ind., died on Friday, July 7, at the age of 80 years. Mr. Sieberling founded the business over a quarter of a century ago, and has been active head of the organization ever since. The company is the manufacturer of the celebrated line of "Paranite" rubber-covered wires and cables, and is also a large manufacturer of bicycle and automobile tires.

MR. DANIEL E. GARRISON, for many years prominent in business circles in St. Louis, died on Tuesday, July 4, at his home in the city of uremia. Mr. Garrison was 76 years of age, and is survived by his son, Arthur C. Garrison, manager of the Columbia Lamp Division of the National Lamp Works of the General Electric Company. Daniel E. Garrison was born at Sharpsburgh, Pa., the son of Oliver Garrison and Louisa C. Hale Garrison. When he was a year old his parents removed to St. Louis, where he was educated at Wyman Academy and Jones' Commercial College. He began his business career in the commission business in St. Louis in 1858, going to New York City in 1863 and opening a branch office. He returned to St. Louis in 1869, to take charge of the Kingsland Iron Company, which later merged into the Vulcan Steel Company, of which he became vice-president and general manager. This company manufactured the first iron and steel rails west of the Mississippi, and opened a railway supply office in 1878. Although Mr. Garrison retired from active business in 1890, he held the presidency of the Corrugated Bar Company, and was also president of the Garrison Realty Company. He was formerly vice-president of the Columbia Incandescent Lamp Company, of St. Louis.

CURRENT ELECTRICAL NEWS

Weekly Record of Construction Activities

EASTERN STATES.

VINALHAVEN, ME. — Incorporators of the Islands Electric Company have asked the Maine Public Utilities Commission for authority to issue $15,000 in six-per-cent preferred stock, $45,000 in common stock and six-per-cent gold bonds to the amount of $60,000.

HAVERHILL, MASS.—The Haverhill Electric Company has obtained permission from the city council to place its lines underground on Walnut Street.

WARE, MASS.—The Ware Electric Company has appealed to the Massachusetts Gas and Electric Light Commission from a decision of the Selectmen of Ware to give a location for a transmission line to the New England Power Company and another line by the Central Massachusetts Light & Power Company, of Palmer. The former company has applied to the Commission for approval of its plan to construct a transmission line from Palmer to Ware.

WINCHENDON, MASS.—The sale of the Winchendon Electric Light & Power Company to C. D. Parker & Company, of Boston, is announced. The property comprises two generating stations, with 650 horsepower, and water rights in Centreville. The assessed value of the property is $30,000. The local management will remain the same as formerly.

WORCESTER, MASS. — Electric light wires will be placed in conduit in Beacon Street in this city.

PROVIDENCE, R. I.—New street-lighting rates for service furnished by the Narragansett Electric Lighting Company went into effect July 1. The rate for arc lamps is reduced from $85 to $80 per year and 100-candlepower incandescent lamps are being operated in place of 90 candlepower. The saving to the city is about $15,000 per year.

NEW BRITAIN, CONN.—The Common Council has authorized the installation of a white-way system here at an estimated cost of $5,000. The United Electric Light & Water Company, which operates here, will make the installation.

COOPERSTOWN, N. Y.—The Colliers Light Heat & Power Company will make a number of extensions to its transmission lines. Franchises for electric service have been granted to the company in the towns of Milford, Otsego, Exeter and Laurens.

GOWANDA, N. Y.—The Gowanda Light & Power Company is erecting an addition to its power house and will install new generating equipment.

NORTH COLLINS, N. Y.—The Niagara & Erie Power Company has petitioned the Public Service Commission for permission to construct electric transmission lines to this village.

PATCHOGUE, N. Y.—The Village Trustees are considering plans for the installation of a boulevard lighting system in North Ocean Avenue.

VINELAND, N. J.—Plans and specifications for extensive improvements to the municipal electric plant, involving an estimated expenditure of $70,000 to $80,000, have been submitted to the Borough by L. R. Lewis of the Lewis & Roth Company, electrical engineers, of Philadelphia. The plans and specifications were approved and bids for the construction work will shortly be advertised. The present power house will be altered and enlarged and there will be installed a 625-kilowatt turbogenerator, two 35-horsepower boilers, surface condenser, and other equipment.

PHILADELPHIA, PA.—The finance committee of the City Council has made an appropriation of $57,000 for the construction of a new power plant for the Electrical Bureau.

PHILADELPHIA, PA.—Hafleigh and Company, American and Somerset Streets, plans the erection of a power house shortly. Another firm which contemplates similar action is Thomas Wolstenholm Sons and Company, Frankford Avenue and Westmoreland Street.

CLIFTON FORGE, VA.—The Virginia Western Power Company recently has increased its capital stock from $500,000 to $1,000,000 for the purpose of enlarging its plants here and at Glasgow, and extending its transmission lines.

BOONE, N. C.—David R. Shearer, electrical engineer, is preparing plans for a hydroelectric plant at Boone's Fork Falls, where a development of 300 horsepower is possible.

ATHENS, GA.—A bill has been introduced into the Legislature providing for the construction of an independent lighting plant at the University of Georgia, Athens, to cost $40,000.

BUTLER, GA.—The Butler Light Company is having estimates prepared for a dam at Little Mill site on Beaver Creek, where a hydroelectric plant will be established. J. A. Childs and H. A. Childs are principal stockholders in the company.

GAINESVILLE, GA.—The Georgia Railway & Power Company has purchased the Gainesville railway system and will build an interurban line connecting with the Duke trolley line running into North and South Carolina. It also plans to buy the Gainesville Midland railway and electrify it. An extension is to be built from Atlanta to Macon.

LAKE WORTH, FLA.—The city has purchased the light, water and ice plant at a cost of $38,230.91. A bond issue was voted for this purpose.

PLANT CITY, FLA.—The Tampa Gas Company has applied for a franchise for an electric-lighting and gas plant, including a white way, more street lights and a slight reduction in price. It is understood that the Plant City Power Company's plant will be acquired and enlarged.

ST. PETERSBURG, FLA.—W. S. Gandy and Walter Fuller, of this city, will build an interurban line from St. Petersburg to Tampa. It is stated that it is already financed.

TARPON SPRINGS, FLA.—J. R. Durrance, chairman of the street railway committee, wants prices on equipment for the installation of an electric-lighting plant, also general data on municipal plants and other public utilities.

NORTH CENTRAL STATES.

BOWLING GREEN, O.—Bids will be opened at noon on July 21 for the construction of a new fireproof building for the training school at the Bowling Green State Normal College. Separate bids may be submitted for the lighting fixtures ready for operation. Address J. E. Shatzel, secretary, Bowling Green, O., or Howard & Merriam, architects, 8 East Broad Street, Columbus.

CINCINNATI, O.—A power building for the use of small manufacturers will be constructed on Sixth Street by the Bodmann estate. It will be ten stories in height, and plans will be drawn by Samuel Hannaford & Sons, architects.

CINCINNATI, O.—Plans are ready for the construction of the boiler and dynamo buildings for the new power plant of the Union Gas & Electric Company, and contracts will be let shortly. The contract for the foundations of the main building has been let to the Foundation Company, of New York City.

COSHOCTON, O.—Under the direction of C. H. Howell, manager of the Ohio Service Company, who is being assisted by C. H. Hawthorne, the company's construction engineer, work has been commenced on a new $25,000 power house, which will take the place of the company's old plant on North Fourth Street.

DAYTON, O.—Schenck & Walker, architects, have plans for the construction of a centralized school for Wayne township, Sulphur Grove, O., which will include an individual electric plant to supply light and a heating and ventilating system. The cost of the building is estimated at $30,000.

FOSTORIA, O.—Plans are being discussed for a new street-lighting system.

SANDUSKY, O.—A six-circuit repeater fire-alarm system will be installed by the city at a cost of approximately $2,000, to take the place of the present three-circuit system.

SPRINGFIELD, O.—The Gray Electric Company, Springfield, has received the contract for installing globes and sockets on the posts for the new ornamental street-lighting system, at $9.65 each.

WASHINGTON, O.—A boulevard lighting system of about 150 lamps will be installed by the city, and bids are being considered. The Washington Gas & Electric Company has submitted a bid for the street lighting as a whole, which has been referred to the light committee of the City Council.

YOUNGSTOWN, O.—The lighting committee of the City Council is considering plans for a number of extensions to the street-lighting system.

SULLIVAN, IND.—The Chamber of Commerce is urging the city to install a cluster electric - lighting system, particularly through the business section of the city.

DE KALB, ILL.—The City Council is making investigations regarding the establishment of municipal electric-lighting and water plants.

DIXON, ILL.—The Illinois Northern Utilities Company is installing a 1,000-kilowatt turbogenerator and auxiliary equipment in its Fifteenth Avenue station in Sterling. The new equipment will be ready in October and will be placed in service to care for the extra load while the water-power plant here is being torn down and rebuilt this fall. When this has been completed, work will be started upon the erection of the large steam plant, which will be used as an auxiliary generating plant.

GALESBURG, ILL.—Extensive improvements will be made in the street-lighting system. All wooden poles will be removed from Simmons Street and the now heavily overloaded arc circuit will be materially relieved by the plan of the city just decided upon to switch all alley lights in the business district from the old center arc circuit to the ornamental lighting system. The city will purchase 200 additional 400-candlepower Mazda lamps. Bids have been advertised for. John Walsh is superintendent of the electric light department.

LEBANON, ILL.—An election will soon be held to vote on the question of issuing $12,000 for improvements to be made to the present municipal electric-lighting plant.

TROY, ILL.—Plans for a 24-hour light and power service are being made by L. O. Wallace, of Collinsville.

MT. PLEASANT, MICH.—The Central Michigan Light & Power Company has been incorporated with a capital of $50,000 by R. H. Webber and J. B. Webber, of Detroit, and others.

EAU CLAIRE, WIS.—Work on the new $2,000,000 Wissota dam on the Chippewa River, which is being erected by the Wisconsin-Minnesota Light & Power Company of this city has progressed so well that the power house is now in the process of construction. This dam will produce 45,000 horsepower and is 7,000 feet long. Its construction involves the removal and relocation of nearly 11 miles of steam railroad line and the reconstruction of a dozen railroad and highway bridges.

EDGERTON, WIS.—The Janesville (Wis.) Electric Company has acquired the holdings of the Edgerton Electric Company, including all poles, wires, appurtenances, the right of way owned by the company in this city and the town of Fulton, franchises, permits and considerable real estate holdings. The consideration was $65,000.

MADISON, WIS.—Approval has been given by the Wisconsin Railroad Commission for a stock issue of $1,000,000, and a bond issue of $2,065,000 to the Wisconsin Power, Light & Heat Company, of Milwaukee. It will consolidate the electric plants at Berlin, Omro, Horicon, Beaver Dam and Baraboo under one management and will construct lines to a number of other villages and cities. Power to operate these properties will come from the hydroelectric development on the Wisconsin River at Portage.

MONTICELLO, WIS.—The City Council has decided to enlarge the capacity of the municipal electric-lighting plant. Bids are being advertised for a 60-kilowatt generator, a 100-horsepower oil engine, switchboard and other equipment. The estimated cost is $7,500. Harrison Smith, electrical engineer, of Madison, has been engaged to supervise the installation of the new equipment.

SHEBOYGAN, WIS. — The Sheboygan Railway & Electric Company, owned by the Reiss interests here, has purchased the electric interurban line running between Plymouth and Elkhart Lake. The deal involved nearly $200,000.

FOSSTON, MINN.—The installation of a white-way system is being considered by the City Council.

CLEARFIELD, IOWA.—David G. Fisher & Company, who recently purchased the electric-lighting plant at Mt. Ayr, are seeking a 25-year franchise in this city. It is intended to erect a transmission line from Mt. Ayr to Diagonal and thence to this city.

GRINNELL, IOWA.—The Grinnell Electric & Heating Company has completed plans for the erection of its new power plant, to cost approximately $100,000. The capacity of the plant will be 1,200 kilowatts. The generating equipment has already been ordered.

WORTHINGTON, IOWA.—A franchise has been granted to the Cedar Rapids Electric Lighting Company to operate an electric-lighting system here.

ST. JOSEPH, MO.—A recommendation has been made to the city for the issuance of $750,000 in bonds, part of the proceeds of which will be used for repairs and improvements to the electric-lighting plant.

BELPRE, KANS.—An election will be called soon to vote on the question of issuing bonds for an electric-lighting plant.

BLUE RAPIDS, KANS.—The Marshall County Power & Light Company has been granted a franchise to erect a new electric-lighting plant here.

HIGHLAND, KANS.—W. V. Warner, owner of the Highland light plant, is considering a proposition to buy current for lighting this town from Hiawatha instead of making it here. The demand for current has outgrown the local plant. The Hiawatha plant which has just installed a 250-horsepower engine, will furnish twenty-four-hour service.

LEWIS, KANS.—An election will be held July 26, to vote on the question of issuing bonds to build an electric transmission line from Kinsley to this place.

OTTAWA, KANS.—The B-R Electric & Telephone Manufacturing Company of Kansas City, Mo., was awarded the contract for the eight-panel switchboard for the additional equipment of the municipal plant here. The same company will furnish the 375-kilowatt, turbine-driven generator. The Therman Efficiency Company has been awarded the general contract.

SHUBERT, NEB.—An election will be held to vote on the question of issuing bonds for the installation of an electric-lighting plant.

PLYMOUTH NEB.—A number of business men of this city have organized the Plymouth Light & Power Company with a capital of $20,000 for the purpose of furnishing electric service here. The intention of the company is to obtain energy from Beatrice or Fairoury.

GARRISON, N. D.—Plans are being made to erect an electric-lighting plant here to furnish service for street lighting. W. M. Robertson is interested in the company.

SOUTH CENTRAL STATES.

AUBURN, KY.—Public-spirited citizens, headed by the mayor, are discussing plans looking toward the establishment here of an electric-lighting plant.

FT. THOMAS, KY.—A power plant will be constructed by the Altamont Hotel Company in connection with plans for a group of buildings for a resort.

FULTON, KY.—More than 15,000 people were in Fulton on the evening of the Fourth of July for the celebration of Independence Day and to be present at the inauguration of service on the white way. This is a 370-lamp system and has been installed at a cost of $5,000. The switch was thrown with much ceremony by Mayor R. M. Chowning and under the lights the city saw its preparedness parade.

BENTON, TENN.—The Benton Light & Power Company has been incorporated by R. W. Clemmer and others of this city with capitalization of $2,500. A substation will be built to reduce the voltage of energy from the Tennessee Power Company's lines.

DATES AHEAD.

Ohio Electric Light Association. Annual convention, Cedar Point, O., July 18-21. Secretary, D. L. Gaskill, Greenville, O.

National Electrical Contractors' Association of the United States. Annual convention, Hotel McAlpin, New York City, July 19-22. Secretary, G. H. Duffield, 41 Martin Building, Utica, N. Y.

International Association of Municipal Electricians. Annual convention, Baltimore, Md., August 22-25. Secretary, C. R. George, Houston, Tex.

Association of Edison Illuminating Companies. Annual convention, Hot Springs, Va., September 4-7. Secretary, George C. Holberton, San Francisco, Cal.

Pennsylvania Electric Association. Annual convention, Eagles Mere, Pa., September 5-8. Secretary, H. N. Muller, Duquesne Light Company, Pittsburgh, Pa.

American Institute of Electrical Engineers. Pacific Coast convention, Seattle, Wash., September 5-8. Secretary, F. L. Hutchinson, 29 West Thirty-ninth Street, New York City.

Illuminating Engineering Society. Annual convention, Philadelphia, Pa., September 18-21. Assistant secretary, C. D. Fawcett, 29 West Thirty-ninth Street, New York City.

Association of Iron and Steel Electrical Engineers. Annual convention, Chicago, Ill., September 18-22. Secretary, W. O. Oschmann, Oliver Steel & Foundry Company, Pittsburgh, Pa.

American Electrochemical Society. Semi-annual meeting, New York City, September 28-30. Secretary, J. W. Richards, South Bethlehem, Pa.

Telephone Pioneers of America. Annual meeting, Atlanta, Ga., October 19-20. Secretary, R. H. Starrett, 15 Dey Street, New York City.

MARYLAND, TENN. — A water-power lighting plant will be built by the Mountain Lake Land Company to furnish lights for a summer resort. P. D. Houston, 329 Union Street, Nashville, is president.

WESTFIELD, TENN.—A new electric-lighting system will be installed by the Westfield Gas & Electric Company on Broad, West Silver, Avery and Mill Streets and Western Avenue.

ANDALUSIA, ALA.—J. D. Henderson, A. C. Darling, J. J. Knox and W. F. Simmons, stockholders of the Andalusia Light & Power Company, have sold their stock to J. N. McClung, of Clearwater, Fla., P. S. McClung, of Florida, Ala., and E. M. Beckett, of Andalusia.

BIRMINGHAM, ALA.—T. Lehman, 1923 Powell Avenue, this city, wants to purchase a slip-ring type motor for hoist service, 100 to 150-horsepower, three-phase, 60-cycle, 2,200 volts, medium speed, preferably drum-type control.

BIRMINGHAM, ALA.—Surveys are being made for an interurban line to be built by the Birmingham Interurban Development Company, the route being 50 miles long. C. J. Rogers, Birmingham, is engineer

BIRMINGHAM, ALA. — The Alabama Power Company has been granted authority by the Public Service Commission to construct a line from Ashland to Lineville and another line to Huntsville.

FAIRFIELD, ALA.—The Hale Light & Power Company has been incorporated with a capital of $10,000 by E. P. Kimbrough and M. H. Murphy. The company's headquarters will be in this city.

MOBILE, ALA.—The Mobile Electric Company has signed a 10-year contract to furnish service for a new country club being established here. The installation will include motor-driven pumps, night illumination of the tennis courts, and it is probable the cooking will be done by electricity.

NEW DECATUR, ALA.—The city voted to issue bonds for the construction of a municipal lighting plant. Mayor James A. Nelson will arrange for the construction of the plant.

WAYNESBORO, MISS.—The holdings of the Waynesboro Electric Light Company have been sold to G. T. Heard, of Brooksville, Miss., for $4,203.

WIRT, OKLA.—The Wirt Electric Light & Power Company has been incorporated with a capital of $1,000 by R. J. Gray and others to furnish electric service here.

DALLAS, TEX.—The Southern Ice and Utilities Company, which was recently incorporated with a capital stock of $650,000, plans to construct and acquire public utility plants in Texas, Louisiana, Arkansas, Colorado and Missouri. Its principal office is in Dallas. C. W. Dawley, W. L. Martin and John L. Booty are interested.

HALLETTSVILLE, TEX.—An oil-burning engine will be installed at the municipal electric-lighting plant at a cost of $7,700.

JACKSONVILLE, TEX.—The Interstate Electric Company has purchased the electric-lighting and ice plants of the Jacksonville Ice & Electric Company and will make improvements to the property.

TAYLOR, TEX.—The municipal street-lighting system will be extended.

WESTERN STATES.

LA JUNTA, COLO.—The installation of a white-way system around the court house square has just been completed. Business men here plan the installation of a similar system of lighting in the business district.

PUEBLO, COLO.—The Arkansas Valley Railway Light & Power Company will install a new arc-lighting system for the city in accordance with arrangements just completed.

LORDSBURG, N. MEX.—The Eighty-five Mining Company has ordered a duplicate of its present electric power plant. The new unit will be of 450-horsepower capacity. A. J. Interrieden is manager.

MOGOLLON, N. MEX.—Earl C. Cleaveland has completed a survey for a proposed hydroelectric plant that is to be constructed in this section to provide power for operating the machinery of the mines of the district. About 1,500 horsepower will be generated.

PHOENIX, ARIZ.—Extensive improvements are to be made in the local establishment of the Western Union Telegraph Company.

GRACE, IDAHO.—According to information recently made public, the proposed power project for the Utah Light & Power Company, under construction at Grace, promises to be one of the largest installations in the intermountain district. It is reported that more than 2,000,000 feet of lumber will be required in building flumes, etc., together with 100 carloads of cement and about 800 tons of reinforcing steel. About 300 men are at work on the site at this time, completing the preliminary work.

POCATELLO, IDAHO.—E. R. Logan, division manager for the Utah Power & Light Company, has advised the people of Lava Hot Springs that the building of its line from the Grace plant to Bancroft will bring its service line within six miles of the Springs, and states that if the Village Board will grant the company a franchise that it will guarantee electric-lighting service within three months.

ROCKLAND, IDAHO.—Application for a certificate allowing the construction of a power plant and distributing lines in and near Rockland has been made to the Public Service Commission by H. B. Logan and J. E. Marsh, of Rockland. The plant to be built will supply Rockland and four adjacent townships with light and power. Actual construction will be started as soon as the required permission is granted.

NORTH YAKIMA, WASH.—W. H. Galvani, traffic department, Pacific Power & Light Company, of Portland, Ore., reports his company will extend its power lines to the Sunnyside district as soon as the commissioners of Yakima County grant the required franchise. The company, which operates in about 36 towns and villages in Eastern Washington, plans immediate extensions and betterments to its properties, especially to the plants and lines in and near North Yakima.

OTHELLO, WASH.—An electric lighting plant in the basement of the Hotel Hibbard to supply the hotel and nearby business houses and possibly energy for street and residence lighting in Othello is to be installed at once by O. G. Vroman and H. J. Coventry, of Othello.

SOUTH BEND, WASH.—The Willapa Power Company will shortly begin construction work on a dam on the South Ford. It will be 24 feet high, and there will be a pipe line about 700 feet long from the dam to the power house.

SPOKANE, WASH.—Improvements and general construction work on the Inland division of the Pacific Telephone & Telegraph Company and Spokane work of the Home Telephone Company, aggregating $51,420, are announced by C. E. Hickman, division commercial superintendent and general manager. Of this amount $39,950 will be spent in Pasco.

SPOKANE, WASH.—The City Council has been petitioned for an electric-lighting, power and steam-heating franchise by the Spokane Valley Power Company, of Spokane, recently organized and incorporated. The company plans developing power by

overflowing the Spokane River at Rocky Gorge, near the old smelter midway between Natatorium and Downriver Parks. A dam which will raise the waters of the river 80 feet at Rocky Gorge is contemplated. H. S. Stoolfire, secretary of the company, reports ample funds to back the project are available and that the company plans to begin operation at an early date.

VANCOUVER, WASH.—A large transformer station is to be erected by the Portland Railway, Light & Power Company near the interstate bridge, across the Columbia River, between Portland, Ore., and this city.

WAITSBURG, WASH.—County Commissioners of Walla Walla County have been petitioned for a 20-year franchise for the erection of a telephone and telegraph system in Walla Wala County by the Rural Telephone Company of Waitsburg, recently organized and incorporated by W. D. Wallace and others.

CLATSKANIE, ORE.—The Public Service Commission has granted permission to the Clatskanie Light & Power Company to increase its rates for commercial and residence lighting. The company also petitioned the commission for permission to increase its lighting rates with the city, but the commission was unable to adjust these rates because of the refusal of the city to submit the question to the commission. The order increasing the rates becomes effective August 1.

SEASIDE, ORE.—An ordinance has been passed by the City Council granting a 25-year extension to the light and power franchise held in this city by the Pacific Power & Light Company. Floyd J. Keys, manager of the company's interests in Seaside, reports that his company will immediately begin the construction of the proposed high-tension power line from Astoria to Seaside and that extensions and betterments to the local plant will be executed at once.

BANNING, CAL.—There is some agitation here for the Banning Gas & Lighting Company to sell its lighting plant to the city.

CALISTOGA, CAL.—The Calistoga Electric Company plans to build a new line to a connection with the Snow Mountain Water and Power Company, and to purchase power from the latter company.

KENNETT, CAL.—Plans have been accepted and a site chosen for an electrolytic plant, costing $350,000, to be built by the Mammoth Copper Company to recover zinc and other metals from the dust recovered in the baghouse of the great smelter.

LOS ANGELES, CAL.—The Board of Public Service Commissioners is taking bids for miscellaneous electrical material and equipment.

LOS ANGELES, CAL.—The Southern California Edison Company has been awarded the contract for furnishing lights for the Tustin lighting district. The same company has been awarded a contract for improvement work in the Graham lighting district also.

OAKLAND, CAL.—The working machinery of the San Francisco municipal railway system, including the cost of construction, durability and overhead expense, is now undergoing a complete investigation by a committee appointed by the Oakland Chamber of Commerce.

PORTERVILLE, CAL.—The Mt. Whitney Power Company is constructing new service lines to Doyle Colony, where considerable development work is being done.

RIVERSIDE, CAL.—The cost to the city of Riverside of the line extension that will be required to furnish power for use of the pumping plant at the new citrus experiment station will be $2,590, according to the report of the superintendent of the city electric light and water plants.

SAN FRANCISCO, CAL.—The United States Government has been granted permission to lay conduits in the streets of this city for telephone and other purposes.

SAN MATEO, CAL.—There is a movement on foot here for the installation of electroliers in the Hayward Park section.

Proposals

STORGE-BATTERY AND SWITCHBOARD APPARATUS.—Sealed proposals will be received by A. Jackson, chairman of the county farm committee, in the county clerk's office at the McLean County courthouse, Bloomington, Ill., for furnishing and installing various storage-battery and switchboard apparatus, according to plans and specifications.

ELECTRIC SUPPLIES.—Bids will be received at the Bureau of Supplies and Accounts, United States Navy Department, Washington, D. C., for furnishing supplies at the following naval stations: Schedule 9870, Norfolk Va., 14 disconnecting and oil switches, and three 500-kilowatt transformers. Schedule 9872, Brooklyn, N. Y., four turning-gear motors. Schedule 9873, Philadelphia, Pa., 6,000 feet of interior communication cable, and 2,175 feet of telephone cable. Schedule 9875, Mare Island, Cal., two induction motors. Schedule 9879, various stations, 45,000 weather-proof sockets. Schedule 9880, various stations, miscellaneous globes and miscellaneous prismatic reflectors. Schedule 9885, Brooklyn, N. Y., miscellaneous desk and bracket fans. Bidders desiring to submit proposals should make application immediately for schedules to the Bureau or to the purchasing office nearest to navy yard where delivery is to be made.

Financial Notes

At the annual meeting of Virginia Railway & Power Company, July 20, the stockholders will be asked to approve an increase in the authorized amount of preferred stock from $8,000,000 to $9,000,200, the additional stock to be issued as required for improvements, extensions and betterments. Virginia Railway & Power now has $7,698,400 of preferred stock outstanding. Earnings of the company are showing good gains, its various franchise questions which have been in dispute have been cleared up, and the jitney competition is also a thing of the past.

The Great Western Power Company has applied to the Railroad Commission for authority to sell $277,000 first-mortgage, five-per-cent 40-year bonds. The company desires to use the money in reimbursing its treasury for additions and improvements heretofore constructed.

Stockholders of the Hartford (Conn.) Electric Light Company have voted to issue 9,000 shares of new stock, half payable August 8 and half November 8, 1916, stockholders to be allowed to take one share of new stock for each four shares held.

Dividends.

	Term	Rate	Payable
Am. Dist. Teleg.	—	1 %	July 15
Am. Lt. & Trac., pf.	Q	1.5 %	Aug. 1
Am. Lt. & Trac., com.	Q	2.5 %	Aug. 1
Am. Lt. & Trac., com.	Stk.	2.5 %	Aug. 1
Asso. Gas & Elec., pf.	Q	1.5 %	July 15
Chicago Rys., series 1	A	8 %	Aug. 1
Commonwealth Edison	Q	2 %	Aug. 1
Cumb. Co. (Me.) Pw. & Lt., pf.	Q	1.5 %	Aug. 1
E. St. Louis & Sub., pf.	Q	0.75%	Aug. 1
Manch. (N. H.) Tr., Lt. & Pw.	Q	2 %	July 15
Monongahela Vl. Tr., com.	Q	1 %	July 15
Ottumwa Ry. & Lt., pf.	Q	1.75%	July 15
Pub. Serv. Inv., pf.	Q	1.5 %	Aug. 1
Puget Sd. Tr., Lt. & Pw. pf.	Q	0.75%	July 15
Ry. & Lt. Sec.	—	3 %	Aug. 1
Ry. & Lt. Sec., pf.	—	3 %	Aug. 1

Reports of Earnings.

SAN JOAQUIN LIGHT & POWER CORPORATION.

San Joaquin Light & Power Corporation reported income for the twelve months ended May 31, 1916, as follows:

	1916	1915
Gross earnings	$1,835,717	$1,775,714
Net after taxes	1,129,407	1,069,134
Total income	1,144,982	1,092,974
Surplus after charges	645,280	563,892
Balance after sinking funds	500,280	434,094

Without taking depreciation charges into consideration, the balance after sinking funds for the twelve months was equivalent to 7.7 per cent on the $6,500,000 six-per-cent preferred stock now outstanding.

PACIFIC GAS & ELECTRIC.

The Pacific Gas & Electric Company has issued its report for the year ended December 31, 1915. Income account compares as follows:

	1915	1914
Gross earnings	$18,530,301	$16,912,688
Operating expenses, taxes, etc.	9,205,593	8,913,922
Depreciation reserve	1,380,000	1,000,000
Net earnings	7,944,708	6,998,766
Other income	413,879	307,816
Total income	8,358,587	7,306,582
Bond and other interest	3,985,411	4,191,401
Bond and note discount and expenses	160,410	469,515
Surplus	4,212,766	2,645,666
First preferred dividend	400,717	14,983
Original preferred dividend	600,000	600,000
Common stock dividend	*1,930,074	
Balance	1,281,976	2,030,682
Reserves	398,188	554,362
Miscellaneous adjuncts	167,017	
Surplus	716,671	1,476,320

*Paid in common stock at par, $1,926,558; cash, $3,515.60.

Pacific Gas & Electric reports earnings for month of May and 12 months as follows:

	1916	1915
May gross	$1,457,548	$1,488,108
Net after taxes	576,752	627,683
Total income	606,491	664,763
Surplus after charges and discounts	270,423	313,933
Five months' gross	7,821,984	7,749,538
Net after taxes	3,261,386	3,393,414
Total income	3,470,655	3,530,658
Surplus after charges and discounts	1,777,920	1,719,264
Balance after preferred dividends	1,209,821	1,263,686
Balance after common dividends	785,108	781,168
12 months' gross	18,602,747	17,591,996
Net after taxes	7,812,681	7,430,093
Total income	8,298,584	7,736,831
Surplus after charges and discounts	4,271,423	3,225,949

DETROIT UNITED LINES.

	1916	1915
May gross	$1,358,322	$1,072,227
Net	418,616	342,378
Surplus after interest and taxes	264,424	181,543
Five months' gross	6,160,389	4,970,316
Net	1,967,673	1,634,642
Surplus after interest and taxes	1,165,817	713,315

PUGET SOUND TRACTION, LIGHT & POWER.

	1916	1915
April gross	$ 645,088	$ 605,180
Net after taxes	222,188	210,598
Surplus after charges	37,898	29,273
Twelve months' gross	7,643,874	8,072,022
Net after taxes	2,764,801	3,166,476
Surplus after charges	571,885	1,025,369

PACIFIC LIGHT & POWER CORPORATION.

	1916	1915
May gross	$ 271,765	$ 227,156
Net after taxes	185,008	152,324
Total income	196,163	163,352
Surplus after charges	90,207	54,737
Five months' gross	1,289,009	1,136,916
Net after taxes	844,764	744,306
Total income	891,903	799,976
Surplus after charges	361,363	259,273

UNITED STATES PUBLIC SERVICE COMPANY.

	1916	1915
May gross	$ 82,515	$ 68,501
Net after taxes	33,699	27,450
Surplus after charges	21,339	14,697
Twelve months' gross	992,416	878,691
Net after taxes	441,069	362,375
Surplus after charges	285,075	211,625

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	July 10	July 3
American Tel. & Tel. (New York)	129¼	128½
Commonwealth Edison (Chicago)	145	143
Edison Electric Illuminating (Boston)	239	238
Electric Storage Battery common (Philadelphia)	62½	62¼
Electric Storage Battery preferred (Philadelphia)	62½	62¼
General Electric (New York)	167	167
Kings County Electric (New York)	130	130
Massachusetts Electric common (Boston)	6	6
Massachusetts Electric preferred (Boston)	32	34
National Carbon common (Chicago)	168	170
National Carbon preferred (Chicago)	121	123
New England Telephone (Boston)	134	134½
Philadelphia Electric (Philadelphia)	29	28⅝
Postal Telegraph and Cables common (New York)	82½	68
Postal Telegraph and Cables preferred (New York)	67⅝	81
Western Union common (New York)	94¼	93¾
Westinghouse common (New York)	56¼	57¾
Westinghouse preferred (New York)	70	67

MONTREAL WATER & POWER.

Montreal Water & Power Company reported for the year ended April 30, 1916, as follows:

	1916	1915
Gross earnings	$775,518	$775,462
Net after taxes	454,340	444,968
Bond interest	250,273	249,241
Other deductions	101,499	72,104
Surplus	102,567	123,623
Previous surplus	312,665	189,042
Total surplus	415,232	312,665

The balance sheet of the company, of date of April 30, 1916, showed current liabilities of $125,000, and current assets of $265,000. In the year the company paid off $250,000 of debentures, $36,500 of capital liabilities to municipalities, and $200,000 on account of the construction of the new Outremont reservoir, without increasing either bonds or share capital. Depreciation reserve of the company now totals $494,000.

Foreign Trade Opportunities

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

The Chicago office of the Bureau of Foreign and Domestic Commerce has received a call from Jack Sloog, manager of the mercantile agency, "Unitas," Amsterdam, who states that he is particularly interested in a good line of electrical novelties for sale in Holland and the Dutch East Indies. He is prepared to place immediate orders, having a sales force already established in both the above named places. Mr. Sloog may be addressed at 723 Transportation Building, Chicago, Ill.

NO. 21651. ELECTRIC-LIGHTING SYSTEM.—An American consular officer in West Africa reports that a municipality in his district, with a population of about 500 white inhabitants and 3,000 natives, contemplates the installation of an electric plant for furnishing the municipality with light and power. Correspondence should be in Portuguese.

NO. 21,715. ELECTRICAL SUPPLIES.—An American consular officer to Spain reports that a manufacturer of electric materials is in the market for electrical apparatus and bell fixtures. References are given. Correspondence may be in English.

New Incorporations

CHICAGO, ILL.—Everready Electric Company. Capital, $1,000. Incorporators: U. T. Young, E. F. Holliday and H. Sternfield.

SAN FRANCISCO, CAL.—McFell Electric Company. Capital, $10,000. Incorporators: F. W. Watts, G. Watts and J. W. Henderson.

NEW YORK, N. Y.—Victor Electric Corporation. Capital $1,312,500. Incorporators: H. S. Blake, William Leslie and H. E. Hanes, all of 30 Church Street.

PEORIA, ILL.—C. A. Hoppin & Company. Capital, $10,000. Electrical and mechanical engineering, contracting, sales and public-utility operations. Incorporators: C. A. Hoppin, R. E. Carlson and J. C. Hoppin.

New Publication

STANDARDS FOR ELECTRIC SERVICE—Electric light and power companies are now subject to regulation by state commissions in more than half of the states of the Union and by municipal ordinance in a number of cities in states not having commission regulation. The supplying of electric service to the public is largely a monopoly, and regulation on behalf of the public is generally considered necessary and economically advantageous. Owing to the very rapid development and constant changes in methods and apparatus, it has heretofore been difficult to fix standards for electric service for general adoption. Developments are of course still going on, but the methods of electrical distribution and measurement in common use, and the criteria of good service generally accepted have become so largely standardized by practice that it is now possible to formulate standards of service that will be generally acceptable.

The popular movement for the regulation of public utility corporations has spread rapidly since 1907 and at the present there are corporation commissions, public service commissions or railroad commissions in every state save two. In the states of Arizona, Connecticut, Illinois, Indiana, Missouri, Montana, New York, New Jersey, New Hampshire, Nevada, Pennsylvania, Oregon, Washington, West Virginia and Wisconsin and the District of Columbia orders and rules for the regulation of electrical corporations have been issued by the commissions. Similar rules are under consideration in several other states, while a few commissions have so far issued only certain recommendations.

Circular No. 56, of the Bureau of Standards, Department of Commerce, discusses the most important factors constituting and promoting safe and adequate electric service, the circular being based on a careful study of the experience of operating companies and regulating bodies, both state and municipal. The circular contains, first, rules and recommendations for the regulation of electric service companies by state commissions; second, three different ordinances suitable for adoption by towns and cities in states not having regulation by commissions; third, specifications for the approval of types of electricity meters by commissions; and fourth, all orders, rules, and regulations so far adopted by commissions for electric service. The rules suggested as suitable for the consideration of state public service commissions are the result of conferences and correspondence with nearly all of the commissions, and careful study and comparison of existing orders and rules.

The suggested regulatory ordinances for electric service in cities are based on a very careful study of the subject and conferences with many operating companies and others qualified to express opinions. Ordinances regulating electric service are so far in force in a very few towns and cities, and in most instances are limited in application to meter inspections and tests upon customers' complaints. Three different ordinances, varying in scope and length, so as to make them useful to municipalities of various sizes from small towns to the largest cities, are proposed and discussed. It is believed these suggested ordinances will be of considerable interest and value to municipal authorities in cities and towns situated in states not having commission regulation of electric utilities. Copies of this report may be obtained without charge upon application to the Bureau of Standards, Washington, D. C.

Electrical Patents Issued June 27, 1916

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,188,384. Electric Fan. C. E. Avery, assignor to Manhattan Electrical Supply Co., Jersey City, N. J. Oscillating mechanism.

1,188,396. Method of and Apparatus for Regulating the Commutation Field in Direct-Current Commutator Machines. L. Binder, assignor to Siemens-Schuckertwerke, G. M. B. H., Berlin, Germany. Commutating poles weakened as speed increases.

1,188,397. Suspension for Axle Generators. W. L. Bliss, assignor to U. S. Light & Heat Corporation, Niagara Falls, N. Y. Details of suspending structures for car-lighting generators.

1,188,398, 1,188,399 and 1,188,400. Generator Suspension. W. L. Bliss, assignor to U. S. Light & Heat Corporation. Various structures for above purpose.

1,188,408. Dry Cell and Battery Thereof. C. F. Burgess, assignor to C. F. Burgess Laboratories, Madison, Wis. Manner of connecting with carbon of carbon-zinc cell.

1,188,430. Method of and Apparatus for Giving Heat Treatment to Magnetic Metals. R. E. Fehr, State College, Pa. Magnetism from external source, passed through steel, which is heated through recalescent point and repeated indications of magnetic condition taken.

1,188,438. Electric Switch. G. Goldman and G. F. Sturgeon, assignors to Central Electric Co., Chicago, Ill. Shunts any one of number of lamps with resistance.

1,188,451. Ignition Timer. E. B. Jacobson, Pittsfield, Mass. Details of rotary contactor.

1,188,460. Alarm for Safety Chests. M. E. Launbranch, assignor to New York Safety Chest Co., New York, N. Y. In chest and operated on jarring or tilting.

1,188,520. Electric Hot-Water-Storage Installation. C. W. Winterbotham, assignor to F. Walker, Melbourne, Australia. Electric tank heater.

1,188,529. Spark Plug. O. Baysdorfer and G. Baysdorfer, Omaha, Neb. Electrodes have point of one opposed to smooth surface of other.

1,188,531. Duplex Wireless System. J. R. Carson, assignor to American Telephone & Telegraph Co., New York, N. Y. Employs different wave lengths for transmission and reception.

1,188,543. Lighting Fixture. H. D. McFaddin, East Orange, N. J. Bowl support for indirect and semi-indirect lighting.

1,188,556. Electrical Water-Heater. G. M. Patterson, assignor to R. Patterson, Waterville, Me. Structure and arrangement of heating tubes.

1,188,564. Electrically Operated Musical Instrument. M. L. Severy and G. B. Sinclair, assignors to Choralcelo Co., Boston, Mass. Tuned rods vibrated by electromagnets.

1,188,565. Apparatus for Treating Disease. M. L. Severy, assignor to Severy Mfg. Co., Boston, Mass. Variable-pressure chamber electromagnetically controlled.

1,188,568. Terminal Box and Plug. E. G. Smith, assignor to Crouse-Hinds Co., Syracuse, N. Y. Has link mechanism operable from exterior of box for moving plug into and out of engagement.

1,188,570. Power System. V. O. Strobel and S. Buckley, Philadelphia, Pa. Several locomotives; each has generating plant and is connected with line for interchange of power.

1,188,574. Vapor Rectifier. P. H. Thomas, assignor to Cooper Hewitt Electric Co., Hoboken, N. J. Single-phase mercury-arc device.

1,188,575. Single-Phase Gas or Vapor Electric Device. P. H. Thomas, assignor to Cooper Hewitt Electric Co. Modification of above.

1,188,576. Circuit-Breaker. P. H. Thomas, assignor to Cooper Hewitt Electric Co. High-potential kick switch comprising mercury-vapor device.

1,188,577 and 1,188,578. Mercury-Vapor Apparatus. P. H. Thomas, assignor to Cooper Hewitt Electric Co. First patent: Container with means for controlling current path in vapor space. Second patent: Distribution of electrode material is regulated.

1,188,579. Method of Operating Vapor Electric Apparatus. P. H. Thomas, assignor to Cooper Hewitt Electric Co. Direct-current motor operated through vapor rectifier.

1,188,580. System of Car Operation by Vapor Converters. P. H. Thomas, assignor to Cooper Hewitt Electric Co. Direct-current motors on locomotive supplied from single-phase trolley through rectifier.

1,188,587. Vapor Electric Apparatus. M. von Recklinghausen, assignor to Cooper Hewitt Electric Company. Quartz tube has constricted part lined with titanium-zircon quartz.

1,188,591. Direction-Indicator for Motor Vehicles. J. E. Whipple, Columbus, O. Has signal arm operated by magnet.

1,188,593. Electric Meter. C. M. Wild, assignor to Bosch Magneto Co., New York, N. Y. May be used as ammeter or volt meter.

1,188,596. Dashlight for Automobiles. J. P. Wilson, Ogdensburg, N. Y. Lamp may be connected with battery or magneto by twisting in socket.

1,188,597. Method and Apparatus for Rectifying Alternating Current. E. R. Wolcott and F. Rieber, assignors to International Precipitation Co., Los Angeles, Cal. Current of gas between electrodes aids electric current in one direction and retards it in other.

1,188,599. Self-Tying Insulator. S. L. Youmans and J. A. McLaughlin, Jesup, Ga. Pivoted wire loop locks conductor in slot.

1,188,603. Refrigerator Alarm. H. Amrhein, South Bethlehem, Pa. Has contacts controlled by drip-pan float.

1,188,621. Cigar Lighter. E. Brunhoff, Cincinnati, O. Has torch lighted by jump spark.

1,188,635. Carbon-Brush Connection. H. B. Eynon, assignor to American Carbon & Battery Co., East St. Louis, Ill. Pigtail secured by amalgam plug.

1,188,645. Signaling System. C. Greenslit, Cleveland, O. and R. Royal, Chicago, Ill. Central annunciator for coins dropped at telephone pay stations.

1,188,647. Means for Preventing Overheating Electric Resistances. E. Gruenfeldt, assignor to Baker R. & L. Co., Cleveland, O. Fuse melted by heat radiated from resistance.

1,188,649. Battery Casing. E. A. Hawthorne, Bridgeport, Conn. Cover structure.

1,188,652. Electrical Relay. S. B. Hess, New York, N. Y. For fire-alarm systems; operated by differential electromagnets.

1,188,653. Electrical Alarm System. S. B. Hess. Arrangement of fire-alarm circuit controlled from alarm stations.

1,188,654. Electrical Apparatus. S. B. Hess. Fire alarm at central operated by current surges controlled at alarm stations.

1,188,663. Vapor Electric Apparatus. M. A. E. Leblanc, assignor to Cooper Hewitt Electric Co. Isolated portion of mercury at cathode maintained at higher temperature than remainder of electrode.

1,188,666. Coin Gauge for Telephone Pay Stations. G. A. Long, assignor to Gray Telephone Pay Station Co., Hartford, Conn. Insures insertion of coin of proper thickness.

1,188,691. Mouthpiece. E. D. Spear, Boston, Mass. Conchoidal-shaped chamber transmits speech into telephone mouthpiece.

1,188,705. Process for the Recovery of Metals from Ores and the Like. C. S. Vadner, Butte, Mont. Electrolysis employed to recover manganese as peroxide from sulphide ores.

1,188,720. Coil-Winding Machine. A. Beutler, assignor to Belden Mfg. Co., Chicago, Ill. Guide pulley feeding wire on spool maintained at uniform distance from coil.

1,188,728. Talking Machine and Attachment Therefor. F. L. Capps, assignor to American Graphophone Co., Bridgeport, Conn. Motor controlled by hook for mouthpiece when not in use.

1,188,734. Electrical Cooker. E. E. Clement, Washington, D. C. Heater controlled by thermostat disabled at certain times of day by clock mechanism.

1,188,749. Electric Testing Clip. H. Frankel, New York, N. Y. For making connection with conductor at any point along its length.

1,188,756. Trapping Device. T. J. Gentry, Scarbro, W. Va. Weight of victim on platform electrically fires gun at him.

1,188,761. Carbon-Brush Connection. C. Hambuechen, assignor to American Carbon & Battery Co. Modification of No. 1,188,635.

1,188,773 and 1,188,774. Vapor Electric Apparatus. P. C. Hewitt, assignor to Cooper Hewitt Electric Co. First patent: Has provision for determining and equalizing flame at cathode surface. Second patent: Negative mercury magnetically shifted in endless groove to successively bring new surfaces into action.

1,188,786. Safety Electric Fuse. S. W. Huff, Brooklyn, N. Y. Manner of securing knife-blade terminals.

1,188,803. Loom Alarm. A. Marcante, Paterson, N. J. Snarl in warp is indicated before thread breaks.

1,188,804. Common-Battery Telephone Exchange System. T. G. Martin, assignor to First Trust & Savings Bank, Chicago, Ill. Automatic.

1,188,822. Float-Controlled Circuit-Closing Mechanism. W. S. Peters, Cement, Cal. Float successively operates levers actuating rotary contactor.

1,188,837. Grinder for Commutators or Distributers of Motor-Car Engines. W. L. Ross, Edinburgh, Scotland. Structural details.

1,188,842. Submarine Buoyant Conveyance. A. Schrumpf, New York, N. Y. Storage battery of submarine on truck automatically shifting according to tilting of boat.

1,188,851. Electrically Operated Valve for Pneumatic Musical Instruments. F. W. Smith, North Tonawanda, N. Y. Magnetic disk valve plays between magnet poles and seat.

1,188,877. Clock. G. J. Anderson, Greensboro, N. C. Electromagnetically driven and controlled by spring balance wheel.

1,188,884. Controlling Mechanism for Dynamos, Motors. J. Bijur, New York, N. Y. Driving connection.

1,188,905. Arrangement for Starting and Regulating Direct-Current Electric Motors. F. Cumont, assignor to Societe S. T. A. R., Paris, France. Current is constant and voltage variable.

1,188,906. Timer. C. H. Cuno, assignor to Cuno Engineering Corporation, Meriden, Conn. Structure of rotary contactor.

1,188,923. Lamp Guard. B. L. George, Methuen, Mass. Wire cage for incandescent lamp.

1,188,924. Revolving Explosion Engine. W. W. Gerber, assignor of one-half to W. P. Gerber, Des Moines, Iowa. Arrangement and structure of electric timer.

1,188,926. Stop Mechanism. E. L. Gold, Brooklyn, N. Y., assignor of one-fourth each to C. Beitel, A. Leopold and J. J. Beechert. For looms, etc.; mechanism for applying brake and opening motor circuit.

1,188,929. Automatic Telephone Exchange System. C. L. Goodrum, assignor to Western Electric Co., New York, N. Y. Comprises a satellite office.

1,188,952. Electrical Water Heater. G. M. Laird, Hillsboro, Ill., assignor of one-half to L. B. Lincoln. Structure of tank and heater.

1,188,966. Automatic Interchangeable Circuit-Breaker. W. S. Mayer, Taunton, Mass. Resembles cartridge fuse and comprises magnetically tripped spring-operated contacts.

1,188,972. Electric Heating Element. F. W. Moffat, assignor to Moffat Stove Co., Weston, Ont., Canada. Insulating support for resistor.

1,189,001. Extension Telephone. D. G. Saunders, Jr., Kansas City, Mo. Wall set.

1,189,006. Pole Climber. J. A. Serene, Kittanning, Pa. Structure of gaffs for linemen.

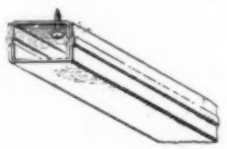
1,189,015. Binding Post. G. B. Thomas, assignor to Perkins Electric Switch Mfg. Co., Bridgeport, Conn. Combined binding post and switch terminal of sheet metal.

1,189,023. Treatment of Wheat and Other Cereals or Cereal Products. W. Watson, assignor to Woodlands Limited, Dover, England. Mixture of water and cereal is electrolyzed.

1,189,044. Adjustable Electric-Light Fixture. W. W. Boden, Berwick, Pa. Lamp cluster and shade supported by telescoping tubes.

1,189,045. Speed Control for Textile Machinery. E. D. Boles, assignor to General Electric Co., Schenectady, N. Y. Adjustable control of speed of ring-spinning machine to adapt it for warp or filling wind.

1,189,050. Dynamo-electric Machine for Combined Electric Lighting and Engine Starting. B. Brooks and W. Holt, Birmingham, England. Direct-current machine employs different armature and windings and number of field poles according to whether run as dynamo or motor.



No. 1,189,208.—Sheet-Metal Molding.

1,189,065. Light Signal. D. M. Crooker, Port Huron, Mich. Lamps lighted and whistle blown simultaneously.

1,189,070. Wireless Telegraphy. D. V. Deitz, Slingerlands, N. Y. Has independent transmitters producing trains of waves of different lengths.

1,189,076. Automobile Signal. E. N. Eisendrath and M. Leishin, Denver, Colo. Normally vertical signal arms at each side carry lamps and are extended in horizontal position at will by electromagnets.

1,189,088. Bracket for Electrical Wire Constructions. G. S. Gardner, assignor to J. R. Fletcher, Dayton, O. Insulator bracket for crossarms.

1,189,101. Luminous Pendant for Pull Switches. A. O. Hannan, Chicago, Ill. Transparent globe has interior luminous coating.

1,189,109. Electrical Measuring Instrument. F. Holden, assignor to General Electric Co. Meter has temperature-controlled driving connection to compensate for speed variation due to temperature change.

1,189,116. Electric Railway-Switch Signaling Device. A. M. Johnson, Cleveland, O. Sliding knife-blade, circuit-changing switch.

1,189,135. Motion-Picture Target Apparatus. G. A. Kerestes, Pittsburgh, Pa. Circuits controlled by hammer of fire-arm.

1,189,160. Wire-Holding Means for Electric Conductors. O. E. Monroe, St. Louis, Mo. Tension grip mounted on insulator.

1,189,161. Wire Lifter and Spacer. O. E. Monroe. For use on poles.

1,189,177. Mechanism for Operating Railway Block Signals. B. C. Rowell, Chicago, Ill. Spring motor wound by passing trains actuates signals, selective actuation of signals being electromagnetically controlled by trains.

1,189,179. Pigtail Connection. W. Shaw, assignor to National Carbon Co., Cleveland, O. Special screw and nut connection with carbon brush.

1,189,180. Electric Machine. F. C. Sinback, Littleton, Ala. Manner of securing pinion to armature spider rotating on shaft.

1,189,181. System of Electric Power Transmission. A. Stauch, assignor to Siemens-Schuckertwerke, G. M. B. H., Berlin, Germany. Polyphase motors each have the phases supplied by different generators, generator phases being varied to affect their succession.

1,189,182. Voltage Regulator. L. W. Thompson, assignor to General Electric Co. Voltage regulator for generator has its adjustment changed during starting of motor.

1,189,183. Signal. R. R. Thompson, Los Angeles, Cal. Electromagnetically operated arm is thrown to one side or the other or continuously vibrated.

1,189,184. Dental Drill. H. A. Whiteside, New York, N. Y. Mounting of small motor in hand tool.

1,189,193. Motor-Controlling Arrangement. F. Cumont, assignor to Societe S. T. A. R., Paris, France. Motor in series across mains with constant-speed, direct-current machine having opposed exciting windings excited by main current and motor voltage.

1,189,208. Conduit for Electric Wires. F. C. Hodkinson, assignor to Safety Armorite Conduit Co., Pittsburgh, Pa. Sheet-metal rectangular molding structure. (See cut.)

1,189,210. Ramp-Rail Controlled Track Circuit. T. W. Scott, Baltimore, Md. Structure and connection of rails, etc.

1,189,213. System of Electrically Setting the Sights of Guns. A. H. Wegner, assignor to Wegner Control System, Portsmouth, N. H. Limit system of gun control; operated from remote keyboard.

1,189,215. Photographic Flashlight. C. Myers, Eugene, Ore. Charge fired by electric fuse.

Reissue. 14,158. Controller for Electric Motors. L. G. Riley, assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Original No. 1,157,904, dated October 26, 1915. Interrelation of resistance, reversing and field-controlling drums.

PATENTS EXPIRED.

The following United States electrical patents expired on July 11, 1916:

628,448. Igniter for Gas Engine. C. O. Carlson, New York, N. Y.

628,457. Device for Producing Electric Currents at Sea by the Action of Waves. M. Gehre, Rath, Germany.

628,464. Electric Signaling Apparatus and Circuit. F. B. Herzog, New York, N. Y.

628,472. Time Alarm for Telephones. H. Keim, Munich, Germany.

628,492. Secondary Battery. C. Ridsdale, Chicago, Ill.

628,514. Electric Vehicle. W. F. Zimmermann, East Orange, N. J.

628,539. Trolley Wheel. J. Kalte, Port Elgin, Canada.

628,567. Telephone-Switch Apparatus, Signal and Circuit. T. C. Wales, Jr., Newton, Mass.

628,597. Electric-Elevator Alarm. H. R. Bruyns, San Francisco, Cal.

628,610. Trolley Pole. S. R. Reynolds, Easton, Pa.

628,650. Electric-Lighting System for Cars. J. L. Creveling, New York, N. Y.

628,658. Electric-Lighting Apparatus for Railway Cars. C. A. Gould, New York, N. Y.

628,661. Battery Electrode. J. C. Howell, London, England.

628,667. Insulated Rail Support. C. K. King and G. A. Mead, Mansfield, O.

628,676. Forming Accumulators. Pollak, Frankfort-on-the-Main, Germany.

628,685. Theater Dimmer. A. W. Berresford, Westfield, N. J.

628,686. Plating Machine. H. R. Boissier, New York, N. Y.

628,695. Electrical Cooking Apparatus. J. B. Cary, Baltimore, Md.

628,696. Molding for Electric Wires or Other Purposes. M. Chase and D. W. Chase, Boston, Mass.

628,702. Electrical Hot-Air Heater. J. A. Elliott, Butte, Mont.

628,739. Primary Battery. E. Baines, New York, N. Y.

628,762. Automatic Circuit-Breaker. C. M. Clark, New York, N. Y.

628,770. Manufacture of Electric Conductors. S. O. Cowper-Coles, London, England.

628,782. Electric Furnace. J. J. Faulkner, Memphis, Tenn.

628,807. Electric-Current Transformer. S. K. Humphrey, Boston, Mass.

628,849. Electric-Current Regulator. F. E. Ramsey, Walsenberg, Colo.

628,855. Galvanic Battery. W. Rowbotham, Birmingham, England.

628,856. Electric-Railway Switch. F. A. Ruff, Detroit, Mich.

Reissue 11,759. Insulation of Electric Wires. J. A. Poche, New Orleans, La.